



ASPE
ASSISTANT SECRETARY FOR
PLANNING AND EVALUATION

OFFICE OF
HEALTH POLICY

Appendices for **REPORT TO CONGRESS**

Social Risk Factors and Performance in Medicare's Value-Based Purchasing Program

The Second of Two Reports Required by the Improving Medicare
Post-Acute Care Transformation (IMPACT) Act of 2014

March 2020

U.S. Department of Health & Human Services

Office of the Assistant Secretary for Planning and Evaluation

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Chapter 1. Introduction

I. IMPACT Act of 2014: Section Authorizing ASPE Studies

IMPROVING MEDICARE POST-ACUTE CARE TRANSFORMATION ACT OF 2014

Public Law 113-185

113th Congress

SEC. 2. STANDARDIZATION OF POST-ACUTE CARE DATA.

...

(d) IMPROVING PAYMENT ACCURACY UNDER THE PAC PAYMENT SYSTEMS AND OTHER MEDICARE PAYMENT SYSTEMS.—

(1) STUDIES AND REPORTS OF EFFECT OF CERTAIN INFORMATION ON QUALITY AND RESOURCE USE.—

(A) STUDY USING EXISTING MEDICARE DATA.—

(i) STUDY.—The Secretary of Health and Human Services (in this subsection referred to as the “Secretary”) shall conduct a study that examines the effect of individuals’ socioeconomic status on quality measures and resource use and other measures for individuals under the Medicare program under title XVIII of the Social Security Act (42 U.S.C. 1395 et seq.) (such as to recognize that less healthy individuals may require more intensive interventions). The study shall use information collected on such individuals in carrying out such program, such as urban and rural location, eligibility for Medicaid under title XIX of such Act (42 U.S.C. 1396 et seq.) (recognizing and accounting for varying Medicaid eligibility across States), and eligibility for benefits under the supplemental security income (SSI) program. The Secretary shall carry out this paragraph acting through the Assistant Secretary for Planning and Evaluation.

(ii) REPORT.—Not later than 2 years after the date of the enactment of this Act, the Secretary shall submit to Congress a report on the study conducted under clause (i).

(B) STUDY USING OTHER DATA.—

(i) STUDY.—The Secretary shall conduct a study that examines the impact of risk factors, such as those described in section 1848(p)(3) of the Social Security Act (42 U.S.C. 1395w–4(p)(3)), race, health literacy, limited English proficiency (LEP), and Medicare beneficiary activation, on quality measures and resource use and other measures under the Medicare program (such as to recognize that less healthy individuals may require more intensive interventions). In conducting such study the Secretary may use existing Federal data and collect such additional data as may be necessary to complete the study.

(ii) REPORT.—Not later than 5 years after the date of the enactment of this Act, the Secretary shall submit to Congress a report on the study conducted under clause (i).

Chapter 1: Introduction

(C) EXAMINATION OF DATA IN CONDUCTING STUDIES.—

In conducting the studies under subparagraphs (A) and (B), the Secretary shall examine what non-Medicare data sets, such as data from the American Community Survey (ACS), can be useful in conducting the types of studies under such paragraphs and how such data sets that are identified as useful can be coordinated with Medicare administrative data in order to improve the overall data set available to do such studies and for the administration of the Medicare program.

(D) RECOMMENDATIONS TO ACCOUNT FOR INFORMATION IN PAYMENT ADJUSTMENT MECHANISMS.— If the studies conducted under subparagraphs (A) and (B) find a relationship between the factors examined in the studies and quality measures and resource use and other measures, then the Secretary shall also provide recommendations for how the Centers for Medicare & Medicaid Services should—

(i) obtain access to the necessary data (if such data is not already being collected) on such factors, including recommendations on how to address barriers to the Centers in accessing such data; and

(ii) account for such factors—

(I) in quality measures, resource use measures, and other measures under title XVIII of the Social Security Act (including such measures specified under subsections (c) and (d) of section 1899B of such Act, as added by subsection (a)); and

(II) in determining payment adjustments based on such measures in other applicable provisions of such title.

(E) FUNDING.—There are hereby appropriated to the Secretary from the Federal Hospital Insurance Trust Fund under section 1817 of the Social Security Act (42 U.S.C. 1395i) and the Federal Supplementary Medical Insurance Trust Fund under section 1841 of such Act (42 U.S.C.1395t) (in proportions determined appropriate by the Secretary) to carry out this paragraph \$6,000,000, to remain available until expended.

END OF EXCERPT

Chapter 5. Risk Adjustment in Quality and Resource Use Measurement

IV. Medical Risk Factors Evaluated in This Report

A. Claims-Based Functional Risk Factors Evaluated

The diagnoses and associated ICD-9 (International Classification of Diseases, Ninth Revision) codes used to identify patients with functional risk factors for frailty-related diagnoses; predictors of functional dependence; mental, behavioral and neurodevelopmental disorders; and potentially disabling conditions are listed in the tables below.

1. Frailty-Related Diagnoses

Table 5.1. Frailty-related Diagnoses and Associated ICD-9 Codes

Frailty-Related Diagnosis	ICD-9 Codes
Abnormality of Gait	781.2
Protein-Calorie Malnutrition	263.9
Abnormal Loss of Weight	783.2
Adult Failure to Thrive	783.7
Cachexia	799.4
Debility	799.3
Difficulty in Walking	719.7
Fall	V15.88
Muscular Wasting and Disuse Atrophy	728.2
Muscle Weakness	728.87
Decubitus Ulcer of Skin	707.0, 707.2
Senility without Mention of Psychosis*	797
Durable Medical Equipment (DME) (cane, walker, bath equipment, and commode)	E0100, 105, 130, 135, 140, 141, 143, 144, 147-149, 160-171

* This diagnosis does not include dementia and Alzheimer's disease diagnosis. They are separately listed in the list of mental, behavioral and neurodevelopmental disorders.

Source: Kim DH, Schneeweiss S. Measuring Frailty Using Claims Data for Pharmacoepidemiologic Studies of Mortality in Older Adults: Evidence and Recommendations. *Pharmacoepidemiology & Drug Safety* 2014;23:891-901. doi:10.1002/pds.3674.

1. Functional Dependence

Table 5.2. Predictors of Functional Dependence

Predictors of Functional Dependence	Associated ICD-9, CPT, or HCPC Codes
Age	
Age Squared	
Female	
Home Hospital Bed	E0250, E0251, E0255, E0256, E0260, E0261, E0265, E0266, E0270, E0290, E0291-297, E0301-304, E0316
Wheelchair	E1050, E1060, E1070, E1083-1093, E1100, E1110, E1120, E1140, E1150, E1160, E1161, E1170, K0001-9
Home Oxygen	E1390-1392, E0431, E0433-435, E0439, E0441-443
Ambulance/Life support	A0426, A0427, A0428, A0429, A0999
Paralysis	342, 438.2, 438.3, 438.4, 438.5, 344., 781.4
Dementia	290, 294, 331, 333.90, 333.92, 333.99, 780.93, 438.0, 797
Cancer Screening	V76
Heart Failure	428, 425, 429.0, 429.1, 429.3, 429.4
Lipid Abnormality	272
Psychiatric	29, 311, 300.00, 310
Vertigo	386., 780.4
Difficulty Walking	719.7, 781.2, 781.3, 438.85, v46.3
Parkinson's Disease	332
Podiatric Care	700, 703, 681.1
Rehabilitation Services	V57.1, v57.21, v57.3, v57.89, v57.9
Arthritis	719.0, 719.1, 719.4, 719.5, 719.9, 711, 715, 716.5, 716.6, 716.8, 716.9, 718, 725, 710, 712, 714
Sepsis	01, 036, 038, 040.0, 041, 032.0, 032.1, 681, 682, 730, 031.0, 031.2, 790.7, 032.82, 032.83, 053.0, 053.13, 054.5, 136.3, 320.0, 785.4, 112.83, 112.81, 112.5
Stroke/Brain Injury	348, 430, 431, 432, 852, 853, 854, 349.82, 433.01, 433.11, 433.21, 433.31, 433.91, 434.01, 434.11, 434.91
Weakness	728.2, 728.87, 799.3, 728.2, 728.3, v49.84
Diabetes Mellitus Complications	250.4, 250.6, 250.7, 250.9

Source: Faurot KR, Jonsson Funk M, Pate V, et al. Using Claims Data to Predict Dependency in Activities of Daily Living as a Proxy for Frailty. *Pharmacoepidemiology & Drug Safety* 2015;24:59-66. doi:10.1002/pds.3719.

2. Mental, Behavioral and Neurodevelopmental Disorders

Table 5.3. Additional Mental, Behavioral and Neurodevelopmental Disorders

Disorder	Associated ICD-9 Codes
Psychiatric Disorders	
Schizophrenia	295
Schizophrenia & Other Psychotic Disorders	293, 295, 297-298
Affective and Bipolar Disorders	296
Psychotic, Neurotic, Personality, Non-Psychotic Mental Disorders	297-301, 306-7, 309-10, 314-315
Depressive Disorders	296, 300, 311
Personality Disorders	301
Post-Traumatic Stress Disorder	309.81
Anxiety Disorder	293, 300, 308, 309, 313
Substance Abuse Disorders	
Drug Use Disorders	292, 304, 305, 648, 655, 760, 779, 965
Alcohol Use Disorders	291, 303, 305, 357, 425, 535, 571, 980
Tobacco Use	305, 649, 989

Note: Only includes conditions that are excluded from the HCC model version 22. These conditions may also overlap with the other three functional risk factor indicators: potentially disabling conditions, predictors of functional dependence and frailty-related diagnoses. The HCC model has recently been updated based on the 21st Century Cures Act to include mental health conditions.

3. Potentially Disabling Conditions

Table 5.4. Other Chronic and Potentially Disabling Conditions

Other Chronic and Potentially Disabling Conditions
ADHD/Conduct Disorders, Hyperkinetic Syndrome
Alcohol Use Disorders
Alzheimer's Disease
Anxiety Disorders
Autism Spectrum Disorders
Bipolar disorder
Cerebral Palsy
Cystic Fibrosis & Other Metabolic Developmental Disorders
Dementia
Depressive disorders
Drug Use Disorders
Epilepsy
Fibromyalgia, Chronic Pain & Fatigue
HIV/AIDS
Intellectual Disabilities & Related Conditions
Learning Disabilities
Leukemias & Lymphomas
Liver Disease, Cirrhosis & Other Liver Conditions
Migraine and Chronic Headache
Mobility Impairments
Multiple Sclerosis & Transverse Myelitis
Muscular Dystrophy
Obesity
Other Developmental Delays
Peripheral Vascular Disease
Personality Disorders
Post-traumatic Stress Disorder (PTSD)
Pressure and Chronic Ulcers
Schizophrenia
Schizophrenia & Other Psychotic Disorders
Sensory: Blindness and Visual Impairment
Sensory: Deafness and Hearing Impairment
Spina Bifida and Other Congenital Anomalies of the Nervous System
Spinal Cord Injury
Tobacco use
Traumatic Brain Injury and Nonpsychotic Mental Disorders Due to Brain Damage
Viral Hepatitis (general) including Hepatitis A, Hepatitis B (acute or unspecified), Hepatitis B (chronic), Hepatitis C (acute), Hepatitis C (chronic), Hepatitis C (unspecified), Hepatitis D, Hepatitis E

Source: Chronic Condition Warehouse. Condition Categories. 2019. (Accessed July 29, 2016, at <https://www.ccwdata.org/web/guest/condition-categories>.)

Chapter 7. Claims-Based Functional Risk Factors and Performance in Medicare Quality and Resource Use Measures

III. Condition-Specific Readmissions

A. Prevalence of Beneficiary Functional Risk factors

Table 7.1. Characteristics of Beneficiaries Included in the Condition-Specific Readmission Measures by Dual-Enrollment Status

Variable	AMI			Heart Failure			Pneumonia			THA/TKA			COPD		
	All	Dual	Not Dual	All	Dual	Not Dual	All	Dual	Not Dual	All	Dual	Not Dual	All	Dual	Not Dual
Admissions (thousands)	160	32	128	367	92	274	274	75	199	306	22	283	263	84	179
% of Admissions		20.0	80.0		25.2	74.8		27.4	72.6		7.3	92.7		31.8	68.2
Readmission Rate (%)	15.7	20.1	14.6	21.2	24.4	20.2	16.6	18.8	15.7	4.4	6.5	4.2	19.6	22.5	18.2
Age (mean)	78	78	78	81	79	81	80	79	80	74	73	74	77	75	77
Male	52.7	38.2	56.3	45.8	32.6	50.3	45.2	35.9	48.8	37.2	20.3	38.5	40.8	34.0	44.0
Race/ethnicity (%)															
Black	7.9	17.1	5.6	12.3	22.7	8.8	7.4	14.2	4.9	4.8	15.3	4.0	9.3	15.9	6.3
Hispanic	4.8	13.4	2.7	5.0	12.6	2.4	5.0	12.2	2.2	3.2	18.2	2.0	4.3	9.6	1.8
White	83.9	62.3	89.3	79.9	58.8	87.0	84.4	67.2	90.9	89.3	57.9	91.7	84.0	70.3	90.4
Other/Unknown	3.4	7.2	2.4	2.8	5.8	1.8	3.2	6.4	2.0	2.7	8.6	2.2	2.3	4.2	1.5
Dually Enrolled (%)	20.0			25.2			27.4			7.3			31.8		
Originally Entitled to Medicare Due to Disability (%)	14.6	26.6	11.6	16.6	26.8	13.1	16.9	28.6	12.5	9.1	29.3	7.5	24.5	36.1	19.0
Social Capital Index (mean)	-0.4	-0.6	-0.4	-0.5	-0.7	-0.4	-0.5	-0.6	-0.4	-0.3	-0.6	-0.3	-0.5	-0.6	-0.4

Note: Based on 2012-2015 admissions. AMI=acute myocardial infarction; THA/TKA=total hip/knee arthroplasty; COPD=chronic obstructive pulmonary disorder.

Table 7.2. Medical Risk of Beneficiaries Included in the Condition-Specific Readmission Measures by Dual-Enrollment Status

Variable	AMI		Heart Failure		Pneumonia		THA/TKA		COPD	
	Dual	Not Dual	Dual	Not Dual	Dual	Not Dual	Dual	Not Dual	Dual	Not Dual
Average HCC risk score	2.43	1.60	3.25	2.58	2.99	2.27	1.46	0.93	2.99	2.37
% Medically Complex (top 20% HCC risk score)	33.6%	16.6%	29.3%	16.9%	28.8%	16.7%	40.5%	18.4%	27.3%	16.6%
% No HCC	12.6%	21.3%	4.8%	6.2%	6.7%	10.2%	23.0%	34.8%	4.4%	5.9%
% 1 HCC	13.3%	19.7%	5.9%	8.5%	9.7%	13.8%	23.9%	27.7%	7.5%	10.6%
% 2 or More HCCs	74.1%	59.0%	89.4%	85.3%	83.5%	76.1%	53.1%	37.4%	88.1%	83.4%
Average Number of Functional Risk Factor Indicators										
Frailty-Related Diagnoses	1.36	0.74	1.92	1.47	1.98	1.38	0.96	0.57	1.67	1.15
Functional Dependence	5.38	3.90	6.75	5.75	6.40	5.12	4.24	3.49	6.14	4.98
Mental, Behavioral and Neurodevelopmental Disorders	1.02	0.53	1.14	0.73	1.40	0.82	0.80	0.40	1.68	1.07
Potentially Disabling Conditions	2.66	1.75	3.02	2.31	3.16	2.21	1.96	1.26	3.34	2.50

Note: Medically complex is HCC risk scores in the highest 20% among stays included in the measure. HCC=hierarchical condition category, a count of comorbid conditions. AMI=acute myocardial infarction; THA/TKA=total hip/knee arthroplasty; COPD=chronic obstructive pulmonary disorder; HCC=hierarchical condition category.

Table 7.3. Prevalence of Frailty Indicators by Dual-Enrollment Status in the Condition-Specific Readmission Measures

Variable	AMI		Heart Failure		Pneumonia		THA/TKA		COPD	
	Dual	Not Dual	Dual	Not Dual	Dual	Not Dual	Dual	Not Dual	Dual	Not Dual
Abnormality of Gait	23.2%	14.8%	30.9%	26.0%	30.1%	24.4%	21.8%	14.5%	26.5%	19.3%
Protein-Calorie Malnutrition	4.5%	1.8%	6.7%	4.3%	8.6%	4.8%	1.0%	0.4%	6.5%	3.9%
Abnormal Loss of Weight	7.7%	5.4%	8.6%	8.4%	11.8%	10.3%	4.1%	2.4%	10.4%	9.3%
Adult Failure to Thrive	3.0%	1.1%	4.3%	2.7%	5.8%	3.1%	0.5%	0.1%	3.7%	2.2%
Cachexia	1.3%	0.5%	1.6%	1.1%	2.7%	1.6%	0.1%	0.0%	3.2%	2.2%
Debility	11.6%	5.5%	19.2%	14.2%	18.1%	12.0%	4.4%	1.8%	16.2%	11.1%
Difficulty in Walking	19.3%	10.7%	27.6%	20.5%	26.6%	18.1%	17.4%	11.6%	22.8%	15.0%
Fall	13.6%	7.9%	17.9%	15.3%	18.7%	14.9%	8.1%	3.1%	15.1%	11.1%
Muscular Wasting and Disuse Atrophy	5.1%	1.9%	7.6%	4.2%	8.9%	4.1%	2.7%	1.6%	6.4%	3.4%
Muscle Weakness	28.7%	14.8%	40.6%	29.5%	41.4%	27.1%	17.2%	10.6%	35.0%	23.5%
Decubitus Ulcer of Skin	8.7%	3.5%	12.8%	8.3%	14.1%	7.5%	1.9%	0.8%	8.7%	5.1%
Senility Without Mention of Psychosis	0.9%	0.5%	1.5%	1.1%	1.4%	1.0%	0.2%	0.1%	1.0%	0.7%
Durable Medical Equipment (DME) (cane, walker, bath equipment, and commode)	8.6%	5.4%	12.9%	11.2%	9.8%	8.9%	16.5%	10.2%	11.2%	8.7%

Note: AMI=acute myocardial infarction; THA/TKA=total hip/knee arthroplasty; COPD=chronic obstructive pulmonary disorder.

Table 7.4. Prevalence of Functional Dependence Indicators by Dual-Enrollment Status in the Condition-Specific Readmission Measures

Variable	AMI		Heart Failure		Pneumonia		THA/TKA		COPD	
	Dual	Not Dual	Dual	Not Dual	Dual	Not Dual	Dual	Not Dual	Dual	Not Dual
Home Hospital Bed	3.8%	1.3%	6.8%	3.5%	5.9%	3.4%	1.6%	0.3%	6.8%	3.2%
Wheelchair	5.1%	2.5%	7.8%	5.5%	7.0%	5.3%	3.4%	1.0%	6.4%	4.6%
Home Oxygen	11.6%	7.5%	23.4%	21.7%	21.6%	20.8%	5.6%	2.3%	44.0%	44.9%
Ambulance/Life Support	54.2%	34.6%	65.9%	50.1%	62.9%	43.5%	19.9%	8.2%	64.6%	45.4%
Paralysis	8.3%	3.2%	9.1%	4.8%	10.6%	4.9%	1.6%	0.7%	6.7%	3.2%
Dementia	31.5%	16.6%	35.5%	24.0%	44.1%	27.4%	11.0%	5.6%	28.5%	18.0%
Cancer Screening	16.7%	24.4%	14.4%	18.5%	15.1%	22.6%	38.1%	47.8%	17.7%	23.0%
Heart Failure	54.7%	37.8%	88.2%	83.5%	57.2%	46.2%	24.5%	14.4%	60.8%	49.8%
Lipid Abnormality	76.3%	76.0%	80.8%	81.3%	69.5%	72.9%	76.6%	76.7%	72.5%	73.6%
Psychiatric	50.8%	29.5%	58.2%	42.2%	66.3%	45.7%	37.9%	21.8%	63.8%	46.3%
Vertigo	20.1%	15.8%	22.2%	20.2%	18.9%	18.6%	17.1%	10.6%	19.6%	16.2%
Parkinson's Disease	3.0%	2.0%	3.4%	2.4%	5.6%	3.8%	1.6%	1.0%	3.5%	2.1%
Podiatric Care	20.5%	13.3%	24.2%	19.4%	24.3%	16.9%	14.2%	9.8%	18.6%	13.1%
Rehabilitation Services	17.3%	12.8%	25.4%	23.5%	24.3%	20.8%	18.2%	14.2%	21.1%	17.6%
Arthritis	63.0%	50.6%	71.0%	61.0%	70.5%	60.5%	99.9%	99.9%	68.5%	55.7%
Stroke/Brain Injury	18.7%	11.0%	22.8%	17.0%	23.5%	16.6%	6.2%	3.6%	18.0%	12.2%
Weakness	34.0%	17.8%	49.1%	36.5%	50.3%	33.1%	19.9%	12.3%	42.3%	29.0%
Bladder Dysfunction	17.0%	13.5%	21.6%	19.7%	22.6%	19.8%	15.6%	12.0%	19.1%	15.9%
Skin Ulcer Decubitus	14.9%	8.3%	21.9%	17.2%	20.2%	13.3%	4.9%	3.2%	13.8%	9.9%
Hypotension Shock	16.4%	11.2%	23.6%	22.3%	19.9%	16.3%	6.2%	4.1%	18.0%	13.8%

Note: AMI=acute myocardial infarction; THA/TKA=total hip/knee arthroplasty; COPD=chronic obstructive pulmonary disorder.

Table 7.5. Prevalence of Mental, Behavioral and Neurodevelopmental Disorders (16 indicators) by Dual-Enrollment Status in the Condition-Specific Readmission Measures

Variable	AMI		Heart Failure		Pneumonia		THA/TKA		COPD	
	Dual	Not Dual	Dual	Not Dual	Dual	Not Dual	Dual	Not Dual	Dual	Not Dual
Alcohol Use Disorder	3.3%	1.9%	3.9%	2.8%	4.0%	2.7%	2.2%	1.5%	6.3%	4.2%
Anxiety Disorders	25.0%	14.4%	29.0%	20.5%	33.2%	22.3%	22.0%	12.7%	42.3%	30.3%
Bipolar Disorder	4.0%	1.3%	4.3%	1.7%	7.0%	2.4%	3.8%	1.1%	7.1%	2.6%
Depressive Disorders	30.0%	16.0%	35.5%	23.8%	40.4%	26.2%	26.9%	15.0%	42.4%	28.7%
Drug Use Disorders	4.2%	1.9%	4.6%	2.6%	5.6%	3.2%	4.1%	1.4%	8.6%	4.3%
Personality Disorders	0.8%	0.2%	0.8%	0.3%	1.3%	0.4%	0.5%	0.1%	1.2%	0.4%
PTSD	0.5%	0.3%	0.5%	0.4%	0.6%	0.5%	0.8%	0.3%	0.9%	0.7%
Schizophrenia	2.3%	0.2%	2.3%	0.3%	4.6%	0.5%	1.5%	0.1%	4.3%	0.6%
Schizophrenia and Other Psychotic Disorders	10.9%	4.2%	12.7%	7.1%	18.2%	8.5%	4.1%	1.1%	13.2%	5.8%
Tobacco Use	16.9%	9.7%	14.9%	9.5%	17.5%	11.1%	10.1%	4.3%	36.1%	25.8%
Development Disorders	0.0%	0.0%	0.1%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
Physiological Malfunction	0.2%	0.1%	0.3%	0.2%	0.3%	0.2%	0.2%	0.1%	0.4%	0.2%
Special Symptoms	3.1%	1.7%	3.8%	2.4%	5.0%	2.9%	2.7%	1.5%	4.2%	2.5%
Nonpsychotic Mental Disorders	0.8%	0.5%	1.0%	0.7%	1.4%	0.9%	0.3%	0.2%	0.9%	0.6%
Hyperkinetic Syndrome	0.1%	0.1%	0.2%	0.1%	0.2%	0.2%	0.4%	0.3%	0.2%	0.2%
Delays in Development	0.3%	0.1%	0.3%	0.1%	0.6%	0.1%	0.2%	0.0%	0.3%	0.1%

Note: AMI=acute myocardial infarction; THA/TKA=total hip/knee arthroplasty; COPD=chronic obstructive pulmonary disorder; PTSD=post-traumatic stress disorder.

Table 7.6. Prevalence of Potentially Disabling Conditions by Dual-Enrollment Status in the Condition-Specific Readmission Measures

Variable	AMI		Heart Failure		Pneumonia		THA/TKA		COPD	
	Dual	Not Dual	Dual	Not Dual	Dual	Not Dual	Dual	Not Dual	Dual	Not Dual
ADHD and Other Conduct Disorders	1.0%	0.3%	0.9%	0.4%	1.8%	0.5%	0.6%	0.4%	1.2%	0.4%
Anxiety Disorders	30.5%	20.4%	33.9%	26.3%	38.3%	28.7%	26.5%	17.5%	48.9%	40.5%
Autism Spectrum Disorders	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
Bipolar Disorder	4.6%	1.6%	4.8%	2.0%	7.7%	2.9%	4.2%	1.3%	7.8%	3.3%
Traumatic Brain Injury and Nonpsychotic Mental Disorders due to Brain Damage	0.8%	0.6%	0.8%	0.8%	1.2%	0.9%	0.4%	0.3%	0.8%	0.6%
Cerebral Palsy	0.2%	0.0%	0.1%	0.0%	0.7%	0.1%	0.1%	0.0%	0.2%	0.0%
Cystic Fibrosis and Other Metabolic Developmental Disorders	1.1%	0.7%	1.3%	1.0%	1.6%	1.0%	0.8%	0.7%	1.2%	0.8%
Depression	35.6%	21.6%	40.3%	29.7%	46.0%	32.9%	32.5%	20.4%	47.8%	36.5%
Epilepsy	5.8%	2.6%	5.8%	3.1%	9.0%	3.9%	2.6%	1.2%	7.0%	3.4%
Chronic Pain Fatigue and Fibromyalgia	22.2%	16.0%	24.6%	19.1%	28.1%	23.3%	27.9%	18.2%	34.0%	24.8%
Sensory: Deafness and Hearing Impairment	9.3%	9.0%	10.2%	11.6%	11.0%	11.8%	6.8%	7.5%	8.4%	8.8%
Viral Hepatitis (General)	2.3%	0.8%	2.8%	1.2%	2.5%	1.0%	1.8%	0.5%	2.5%	0.8%
HIV/AIDS	0.3%	0.1%	0.3%	0.1%	0.4%	0.1%	0.2%	0.0%	0.3%	0.1%
Intellectual Disabilities and Related Conditions	1.0%	0.1%	1.0%	0.2%	2.6%	0.1%	0.7%	0.0%	0.9%	0.1%
Learning Disabilities	0.3%	0.1%	0.3%	0.1%	0.3%	0.2%	0.1%	0.0%	0.2%	0.1%
Leukemias and Lymphomas	1.6%	2.4%	2.0%	3.5%	2.7%	5.1%	1.1%	1.5%	1.7%	2.4%
Liver Disease Cirrhosis & Other Liver Conditions (excluding Hepatitis)	7.8%	5.8%	11.5%	10.1%	8.3%	7.2%	4.3%	3.0%	7.8%	6.4%

Chapter 7: Claims-Based Functional Risk Factors and Performance in Medicare Quality and Resource Use Measures

Variable	AMI		Heart Failure		Pneumonia		THA/TKA		COPD	
	Dual	Not Dual	Dual	Not Dual	Dual	Not Dual	Dual	Not Dual	Dual	Not Dual
Migraine and Other Chronic Headache	1.8%	1.6%	1.6%	1.4%	2.2%	2.1%	3.3%	2.8%	3.1%	2.4%
Mobility Impairments	10.7%	5.0%	10.6%	6.0%	12.0%	6.0%	2.2%	1.0%	7.7%	4.0%
Multiple Sclerosis and Transverse Myelitis	0.3%	0.3%	0.4%	0.3%	0.6%	0.5%	0.3%	0.2%	0.5%	0.3%
Muscular Dystrophy	0.1%	0.1%	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%	0.1%	0.0%
Obesity	24.5%	20.1%	35.9%	27.6%	23.0%	17.9%	35.5%	26.9%	32.7%	26.2%
Other Developmental Delays	0.2%	0.0%	0.2%	0.0%	0.5%	0.0%	0.2%	0.0%	0.2%	0.0%
Personality Disorders	0.8%	0.2%	0.8%	0.3%	1.3%	0.4%	0.6%	0.1%	1.4%	0.4%
Post-Traumatic Stress Disorder	0.6%	0.5%	0.5%	0.5%	0.7%	0.7%	0.9%	0.5%	1.1%	0.9%
Peripheral Vascular Disease	43.7%	31.9%	46.9%	41.3%	40.5%	30.9%	17.4%	10.6%	36.7%	31.9%
Schizophrenia	2.5%	0.3%	2.4%	0.4%	4.8%	0.6%	1.5%	0.1%	4.5%	0.7%
Schizophrenia and Other Psychotic Disorders	11.3%	4.7%	11.9%	6.7%	17.6%	8.6%	4.3%	1.6%	13.1%	6.1%
Spina Bifida & Other Congenital Anomalies of the Nervous System	0.2%	0.2%	0.2%	0.3%	0.3%	0.4%	0.1%	0.1%	0.2%	0.2%
Spinal Cord Injury	0.5%	0.3%	0.6%	0.5%	0.9%	0.6%	0.3%	0.1%	0.6%	0.5%
Tobacco Use Disorders	21.5%	14.5%	16.9%	11.4%	20.0%	13.8%	11.4%	5.4%	40.7%	32.2%
Pressure Ulcers and Chronic Ulcers	19.2%	11.1%	26.7%	21.9%	24.5%	16.6%	5.4%	3.5%	16.8%	12.6%
Sensory: Blindness and Visual Impairment	4.4%	1.9%	5.2%	3.0%	4.8%	2.6%	1.8%	0.4%	3.9%	2.3%

Note: AMI=acute myocardial infarction; THA/TKA=total hip/knee arthroplasty; COPD=chronic obstructive pulmonary disorder.

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E. Policy Simulations: Impact on Hospitals' Performance and Penalties

Table 7.7. High-DSH and Other Hospitals for the Conditions in the Hospital Readmissions Reduction Program

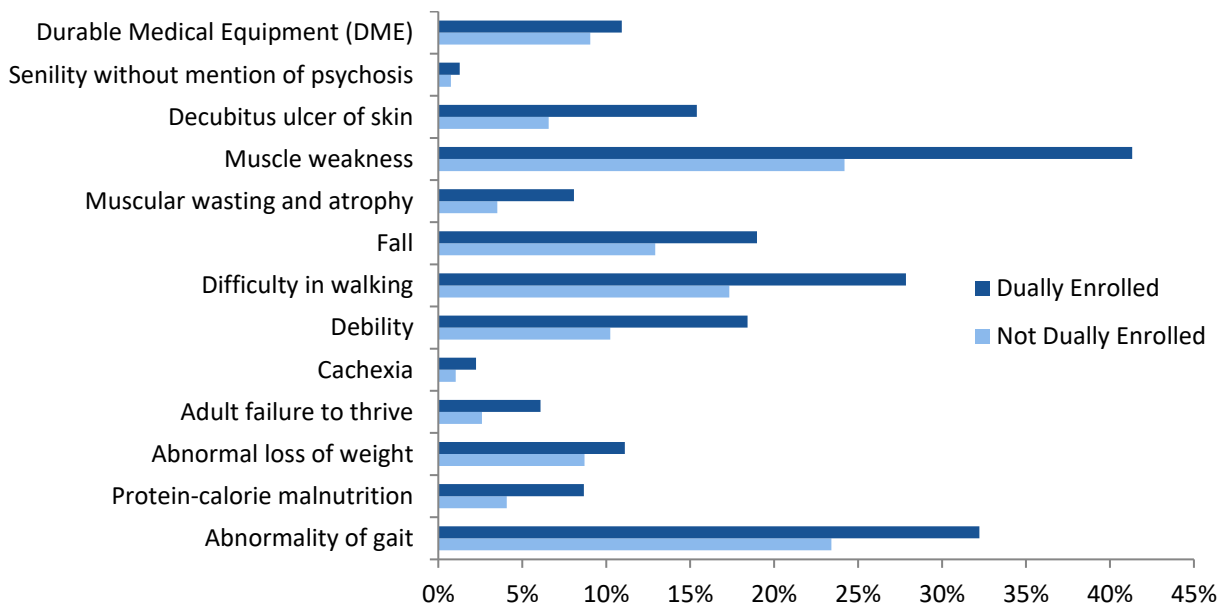
	High-DSH (n=607)		Other Hospitals (n=2,548)	
	Average Cases	Average Base MS-DRG Payments	Average Cases	Average Base MS-DRG Payments
AMI	37.5	\$562,978	52.3	\$718,303
Heart Failure	88.6	\$705,366	118.1	\$877,508
Pneumonia	61.8	\$441,291	89.1	\$603,375
COPD	63.4	\$433,942	84.5	\$550,867
THA/TKA	46.4	\$753,551	104.8	\$1,378,178

Note: DSH=disproportionate share hospital; MS-DRG=Medicare Severity-Diagnosis Related Group; AMI=acute myocardial infarction; THA/TKA=total hip/knee arthroplasty; COPD=chronic obstructive pulmonary disorder.

IV. All-Cause Hospital Readmissions

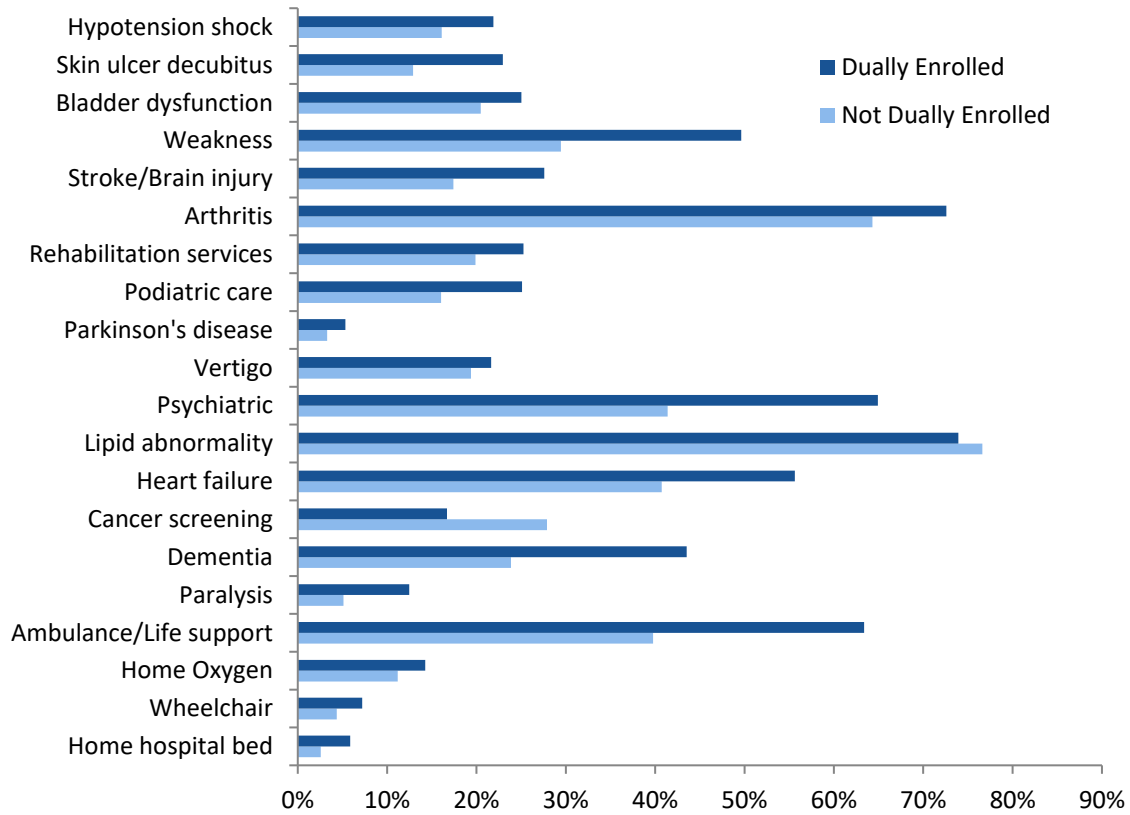
A. Prevalence of Beneficiary Functional Risk factors

Figure 7.1. Prevalence of Frailty Indicators by Dual Enrollment Status in the All-Cause Hospital Readmission Measure



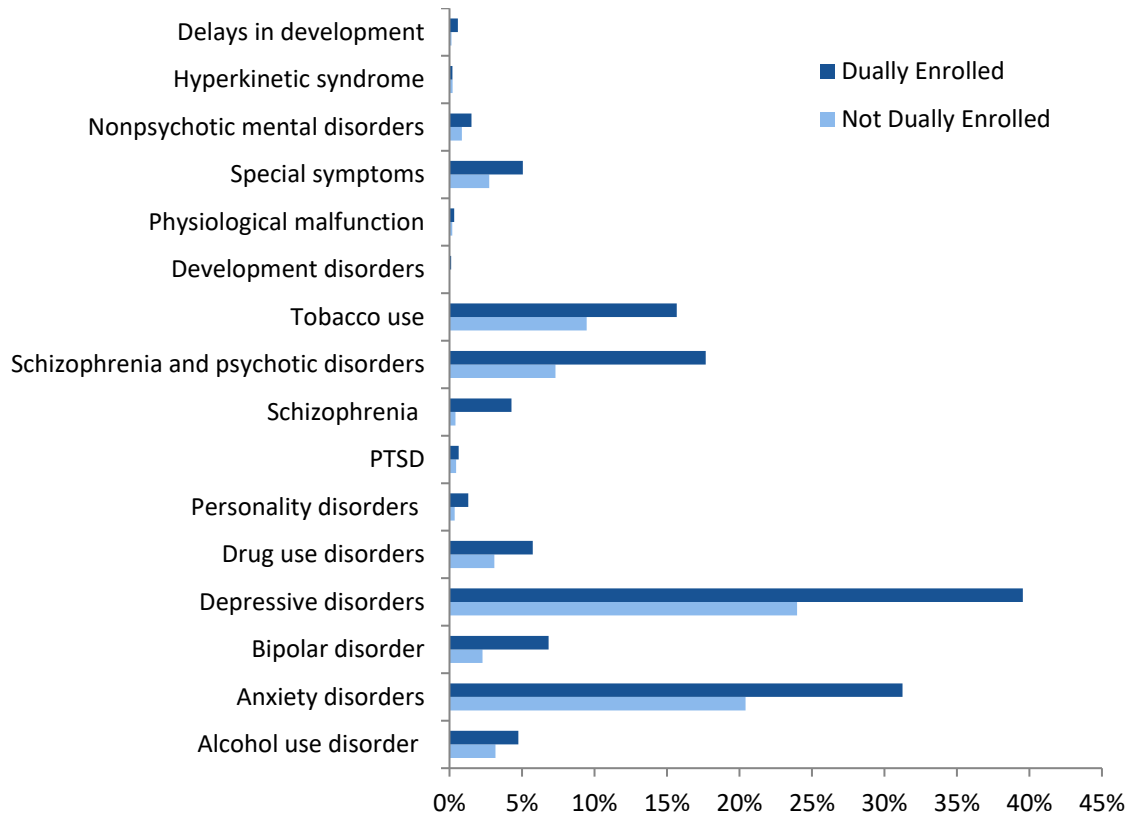
**Chapter 7: Claims-Based Functional Risk Factors and Performance
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Figure 7.2. Prevalence of Functional Dependence Indicators by Dual Enrollment Status in the All-Cause Hospital Readmission Measure



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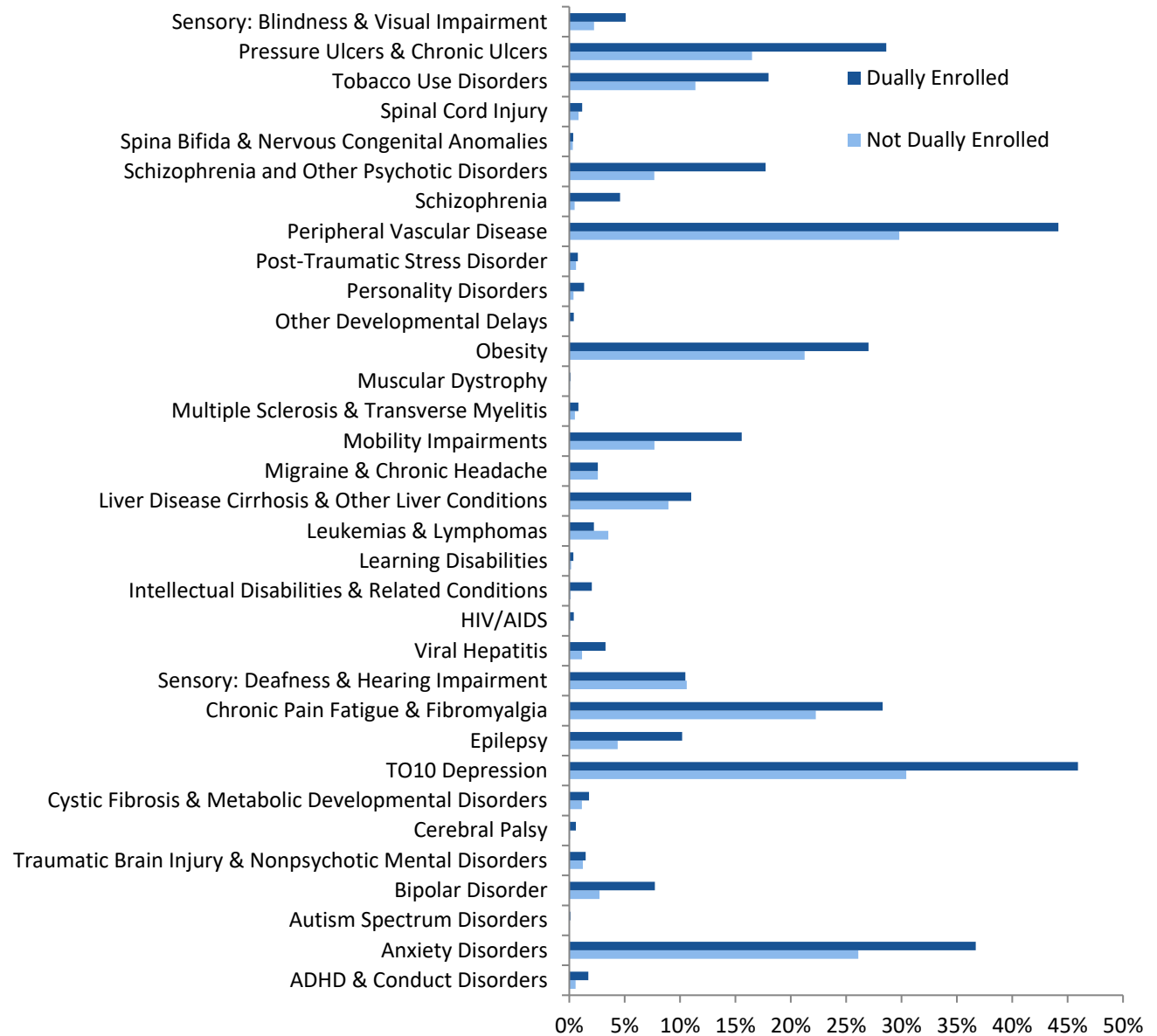
Figure 7.3. Prevalence of Mental, Behavioral and Neurodevelopmental Disorders by Dual Enrollment Status in the All-Cause Hospital Readmission Measure



Note: PTSD=post-traumatic stress disorder.

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Figure 7.4. Prevalence of Potentially Disabling Conditions by Dual Enrollment Status in the All-Cause Hospital Readmission Measure



B. Associations between Functional Risk factors, Existing Beneficiary Social Risk Factors and Beneficiary Outcomes

Table 7.8. Association between Potentially Disabling Conditions and Readmissions in the Medical Cohort, Controlling for Measure Risk Adjustment and Dual-Enrollment Status

Potentially Disabling Condition Indicator	Odds Ratio	Std. Error
ADHD and Other Conduct Disorders	1.07	0.01
Anxiety Disorders	1.22	0.00
Autism Spectrum Disorders	1.01	0.08

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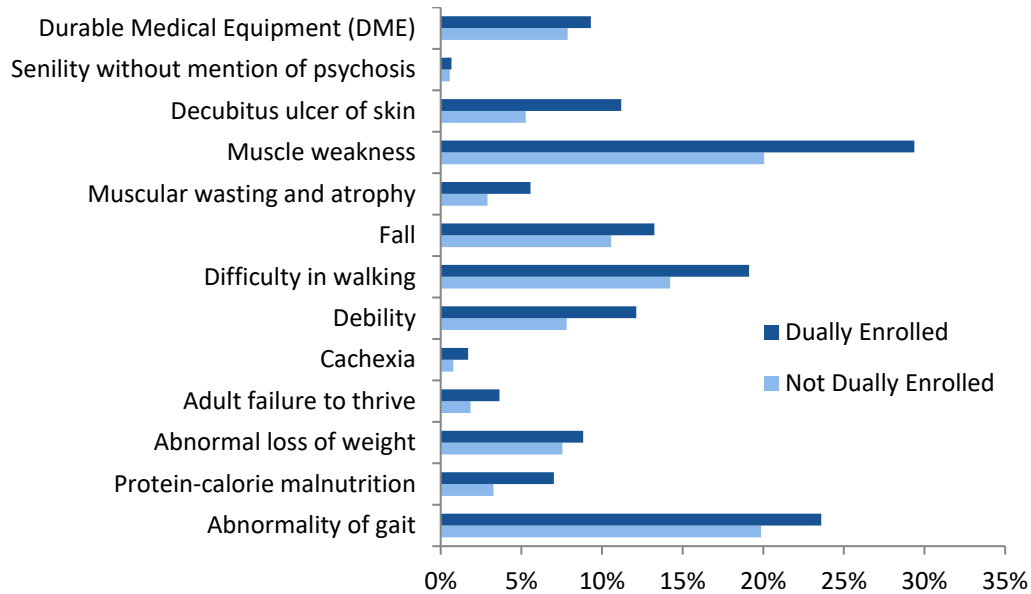
Potentially Disabling Condition Indicator	Odds Ratio	Std. Error
Bipolar Disorder	1.02	0.01
Traumatic Brain Injury and Nonpsychotic Mental Disorders Due to Brain Damage	1.06	0.01
Cerebral Palsy	1.14	0.03
Cystic Fibrosis and Other Metabolic Developmental Disorders	1.17	0.01
TO10 Depression	1.11	0.00
Epilepsy	1.51	0.01
Chronic Pain Fatigue and Fibromyalgia	1.15	0.00
Sensory: Deafness and Hearing Impairment	1.06	0.01
Viral Hepatitis	1.16	0.01
HIV/AIDS	1.10	0.04
Intellectual Disabilities and Related Conditions	1.20	0.02
Learning Disabilities	1.03	0.03
Leukemias and Lymphomas	1.18	0.01
Liver Disease Cirrhosis & Other Liver Conditions (excluding hepatitis)	1.36	0.01
Migraine and Other Chronic Headache	1.03	0.01
Mobility Impairments	1.22	0.01
Multiple Sclerosis and Transverse Myelitis	1.04	0.02
Muscular Dystrophy	1.12	0.05
Obesity	1.13	0.00
Other Developmental Delays	1.20	0.04
Personality Disorders	1.04	0.02
Post-Traumatic Stress Disorder	0.96	0.02
Peripheral Vascular Disease	1.07	0.00
Schizophrenia	0.86	0.01
Schizophrenia and Other Psychotic Disorders	1.28	0.01
Spina Bifida & Other Congenital Anomalies Nervous System	1.23	0.03
Spinal Cord Injury	1.10	0.02
Tobacco Use Disorders	1.13	0.01
Pressure Ulcers and Chronic Ulcers	1.43	0.01
Sensory: Blindness and Visual Impairment	1.05	0.01

Note: Bolded odds ratios are statistically significant at p<0.05.

V. Medicare Spending per Beneficiary (MSPB)

A. Prevalence of Beneficiary Functional Risk factors

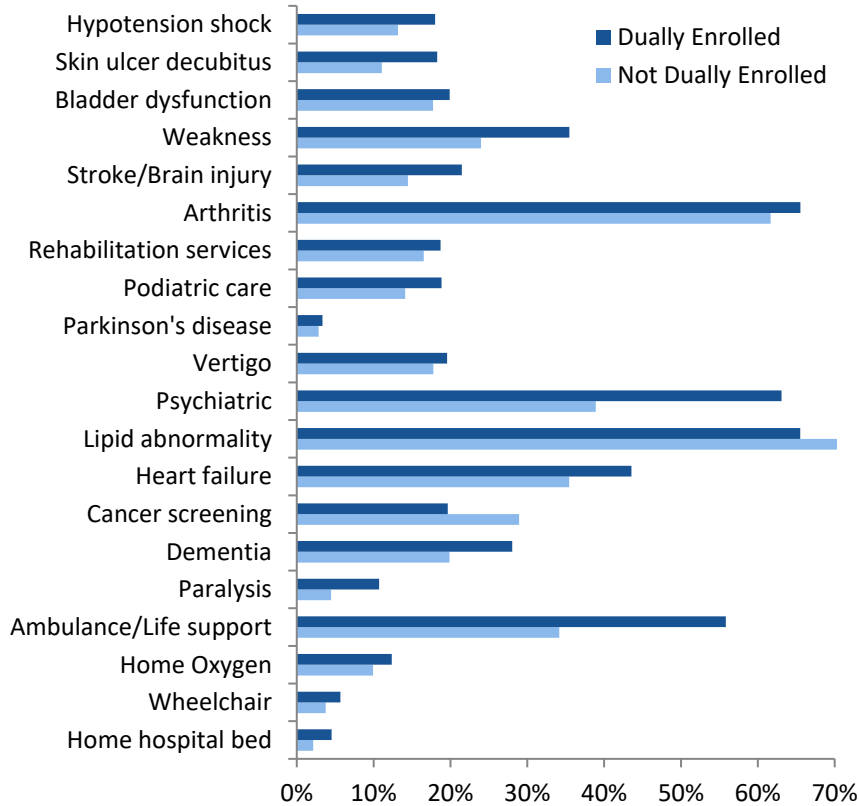
Figure 7.5. Prevalence of Frailty Indicators by Dual Enrollment Status in the MSPB Measure Cohort



Note: MSPB=Medicare spending per beneficiary.

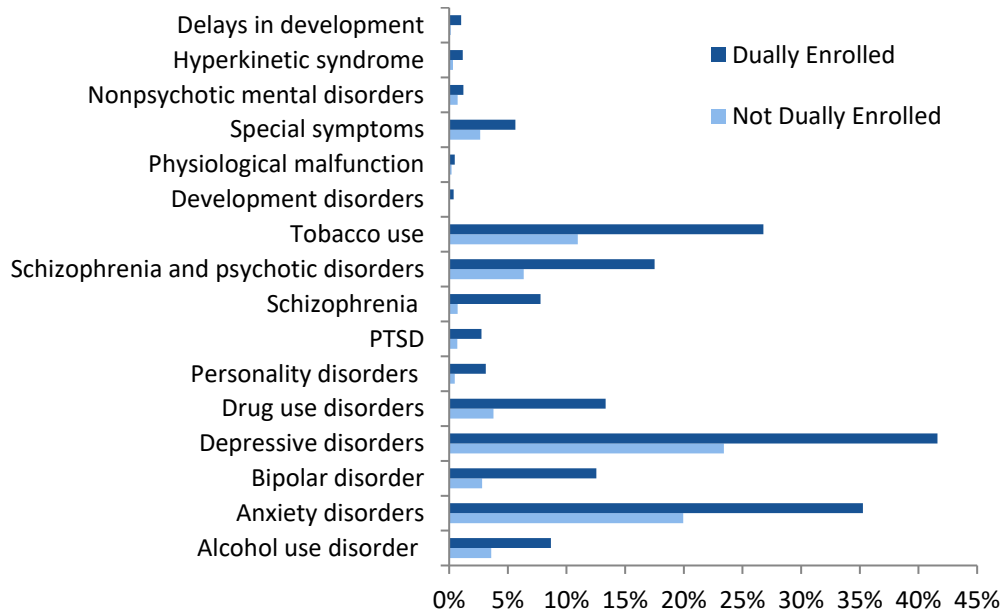
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Figure 7.6. Prevalence of Functional Dependence Indicators by Dual Enrollment Status in the MSPB Measure Cohort



Note: MSPB=Medicare spending per beneficiary.

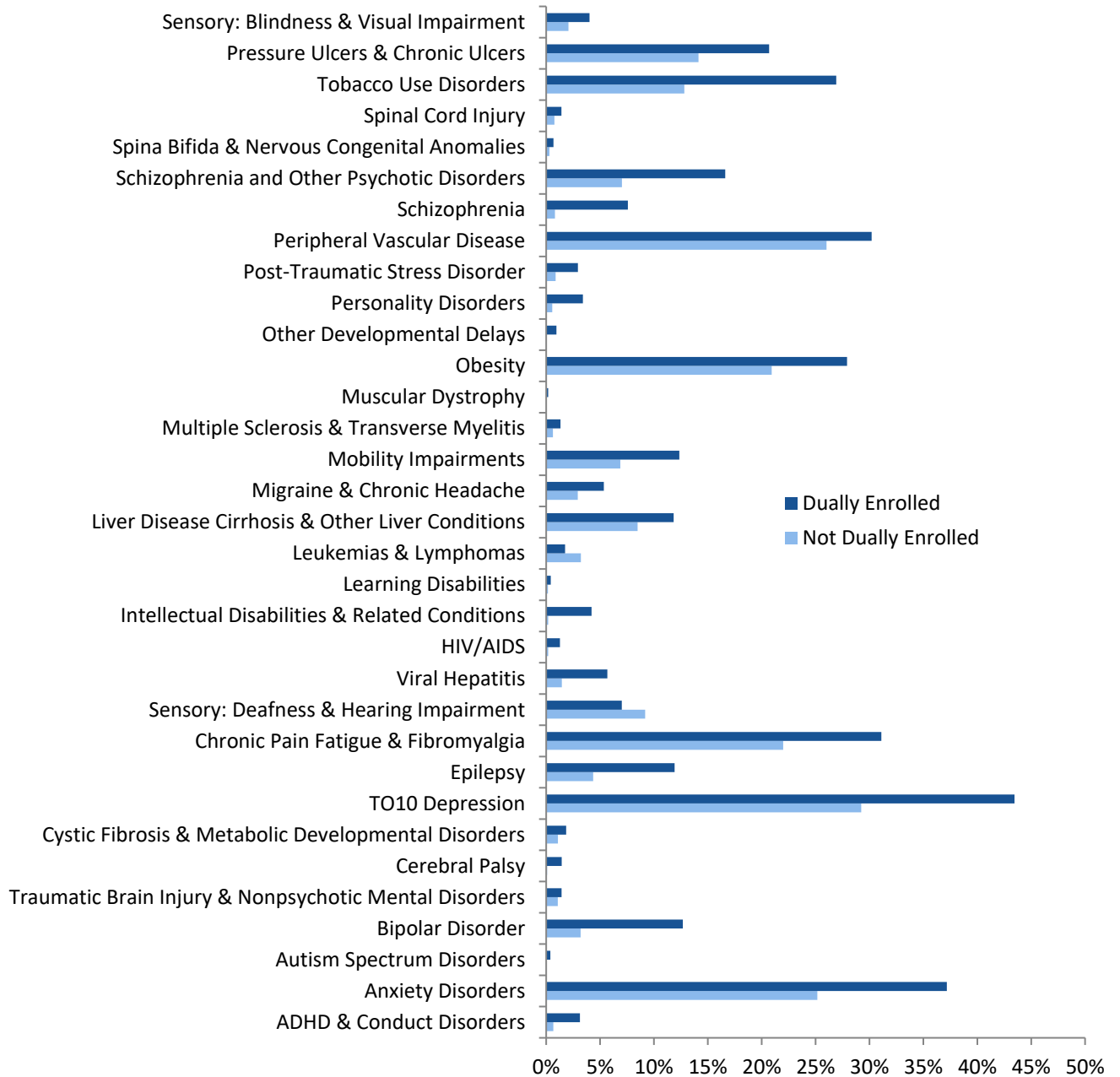
Figure 7.7. Prevalence of Mental, Behavioral and Neurodevelopmental Disorders by Dual Enrollment Status in the MSPB Measure Cohort



Note: MSPB=Medicare spending per beneficiary; PTSD=post-traumatic stress disorder.

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Figure 7.8. Prevalence of Potentially Disabling Conditions by Dual Enrollment Status in the MSPB Measure Cohort

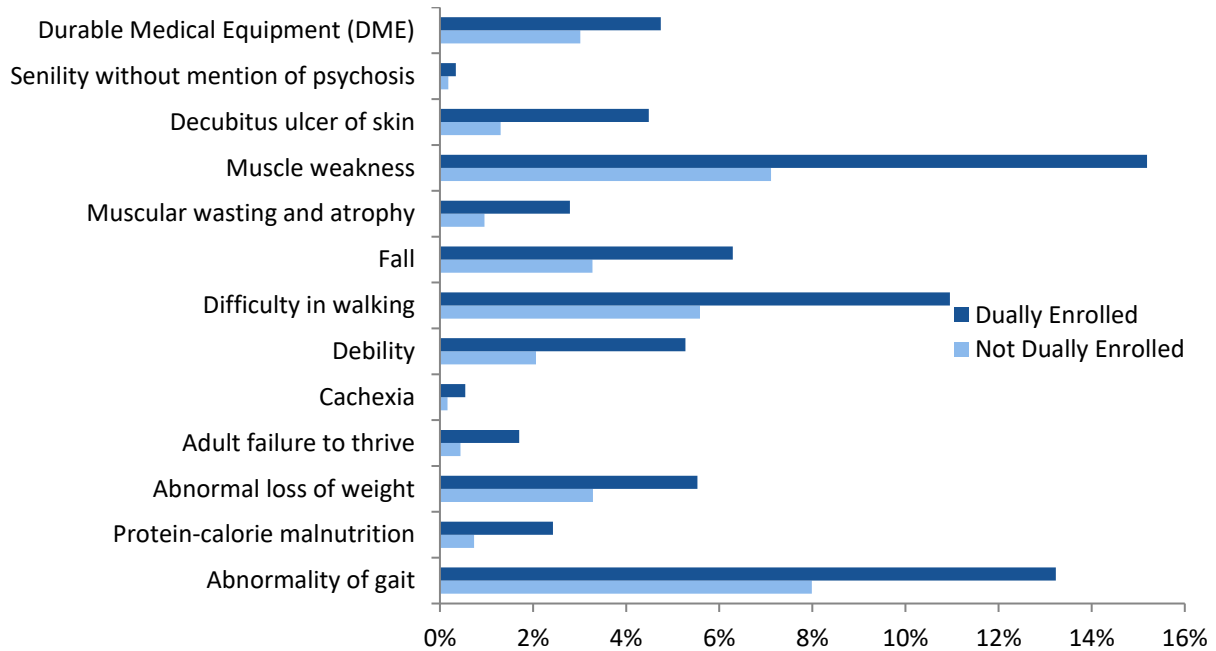


Note: MSPB=Medicare spending per beneficiary.

VI. Total per Capita Cost (TPCC) Measure

A. Prevalence of Beneficiary Functional Risk factors

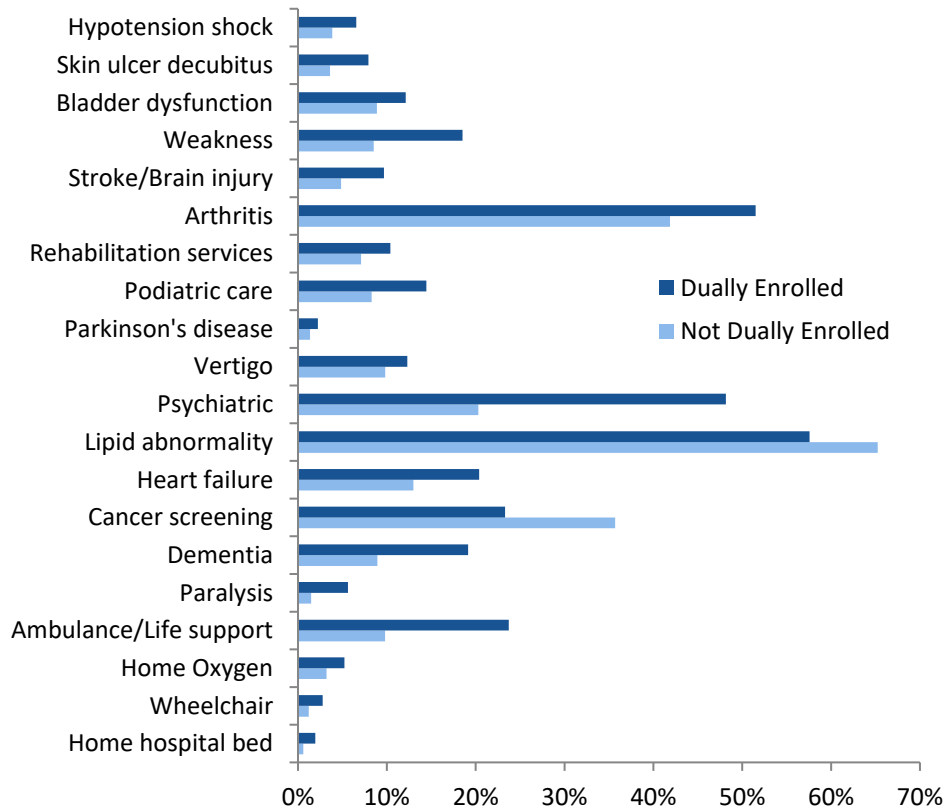
Figure 7.9. Prevalence of Frailty Indicators by Dual Enrollment Status in the TPCC Measure Cohort



Note: TPCC=Total per capita cost.

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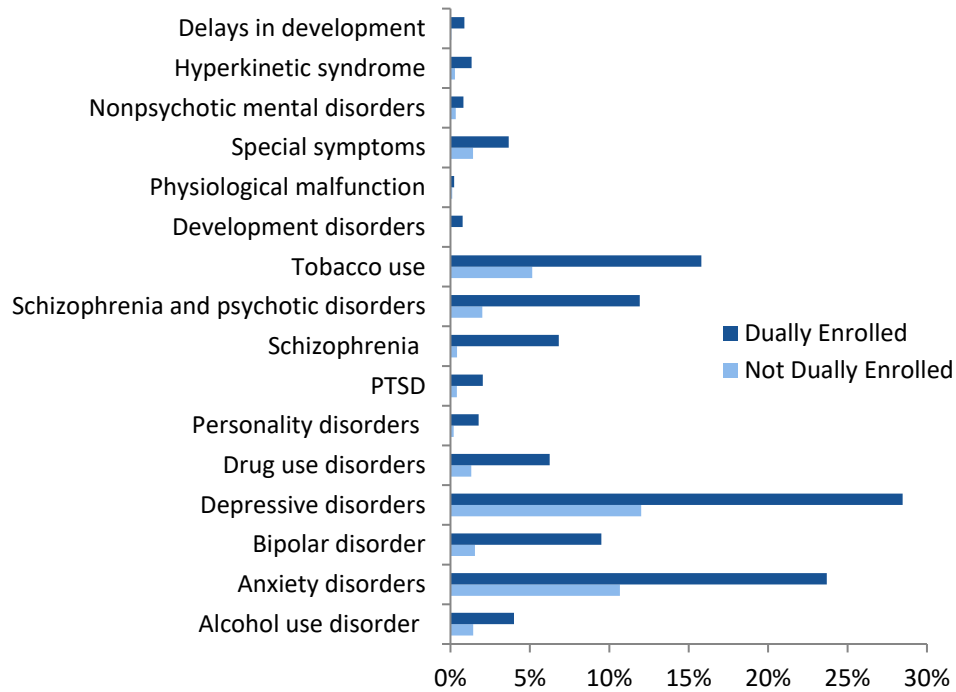
Figure 7.10. Prevalence of Functional Dependence Indicators by Dual Enrollment Status in the TPCC Measure Cohort



Note: TPCC=Total per capita cost.

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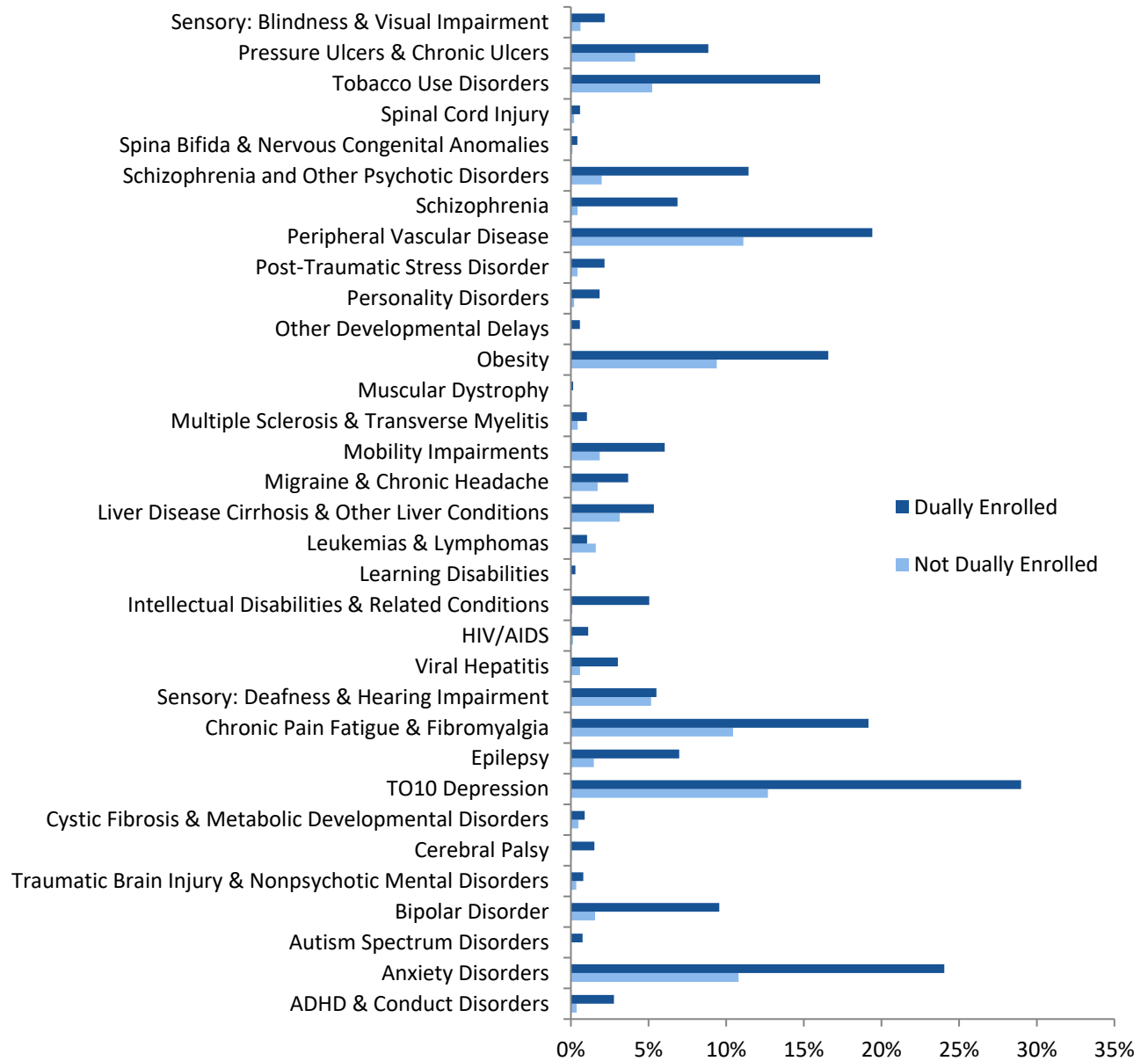
Figure 7.11. Prevalence of Mental, Behavioral and Neurodevelopmental Disorders by Dual Enrollment Status in the TPCC Measure Cohort



Note: TPCC=Total per capita cost; PTSD=post-traumatic stress disorder.

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Figure 7.12. Prevalence of Potentially Disabling Conditions by Dual Enrollment Status in the TPCC Measure Cohort

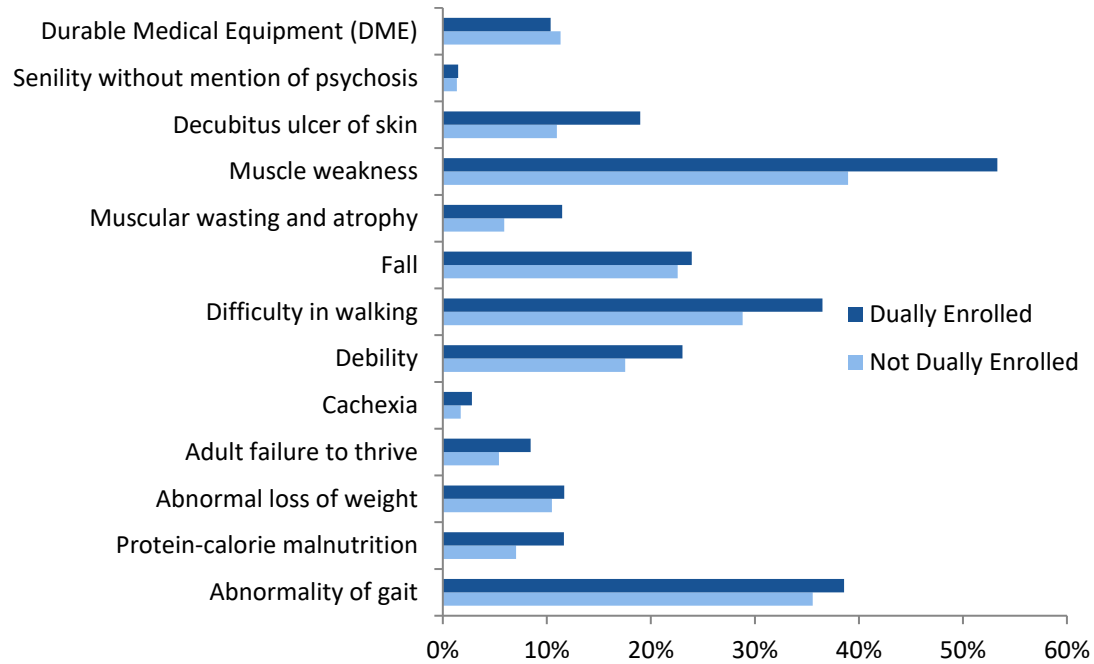


Note: TPCC=Total per capita cost.

VII. Skilled Nursing Facility (SNF) Readmission Measure

A. Prevalence of Beneficiary Functional Risk Factors

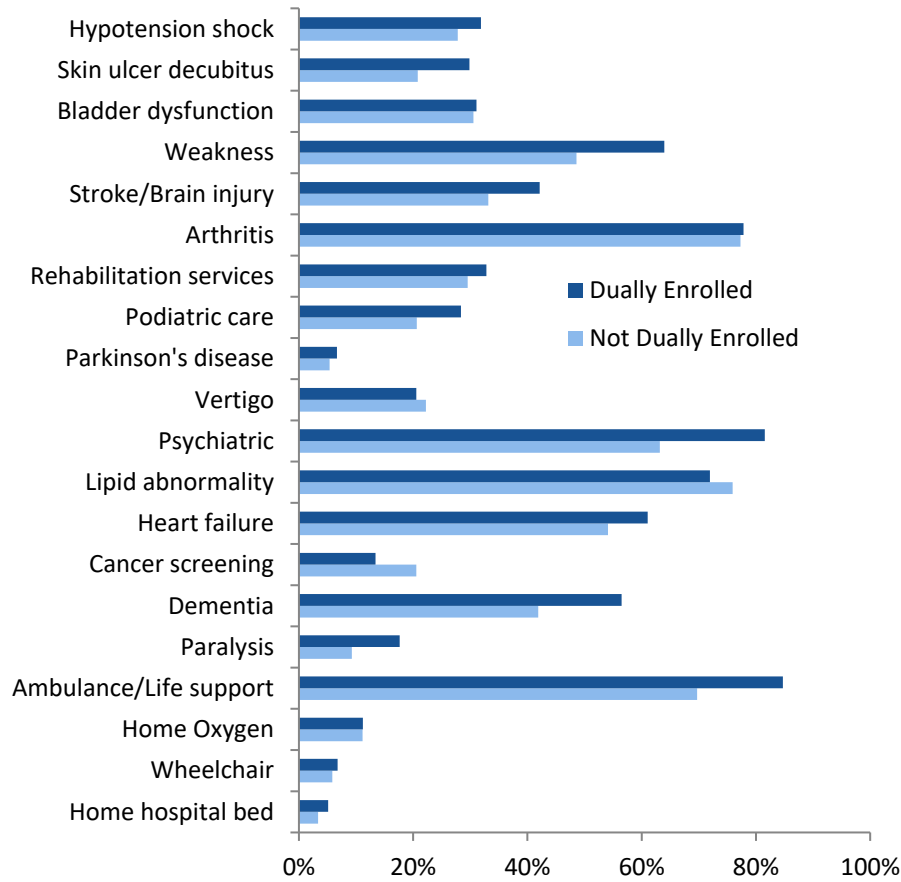
Figure 7.13. Prevalence of Frailty Indicators by Dual Enrollment Status in the SNF Readmission Measure Cohort



Note: SNF=Skilled nursing facility.

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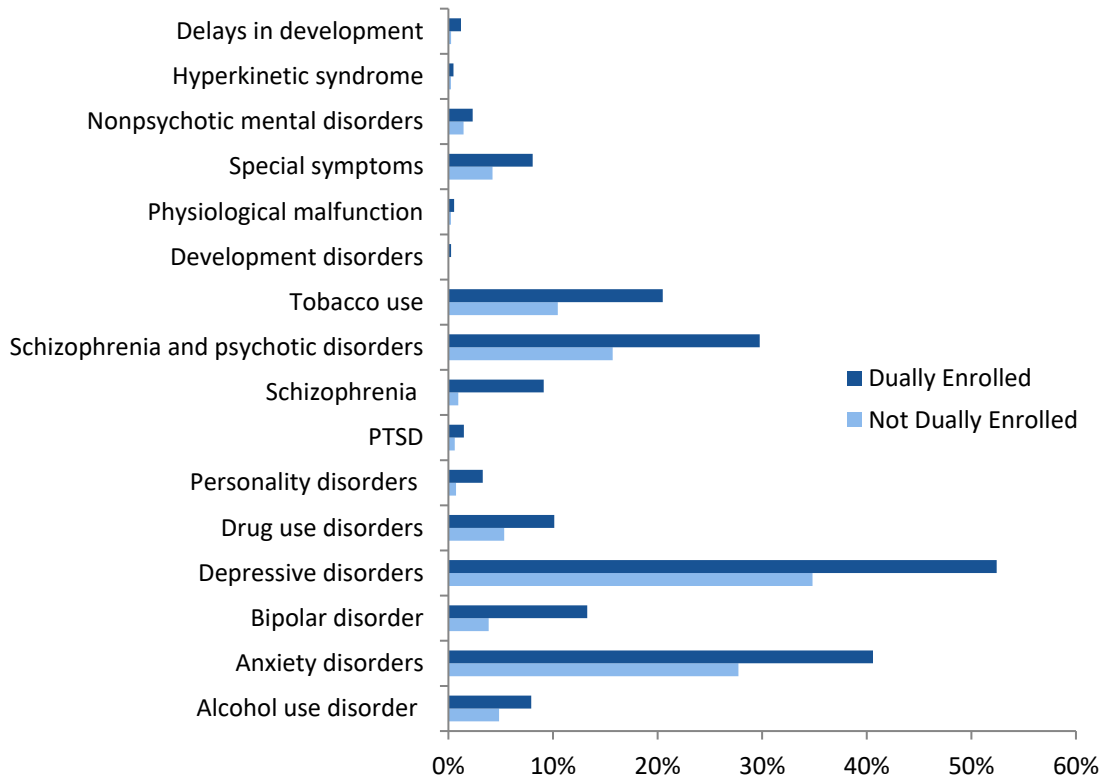
Figure 7.14. Prevalence of Functional Dependence Indicators by Dual Enrollment Status in the SNF Readmission Measure Cohort



Note: SNF=Skilled nursing facility.

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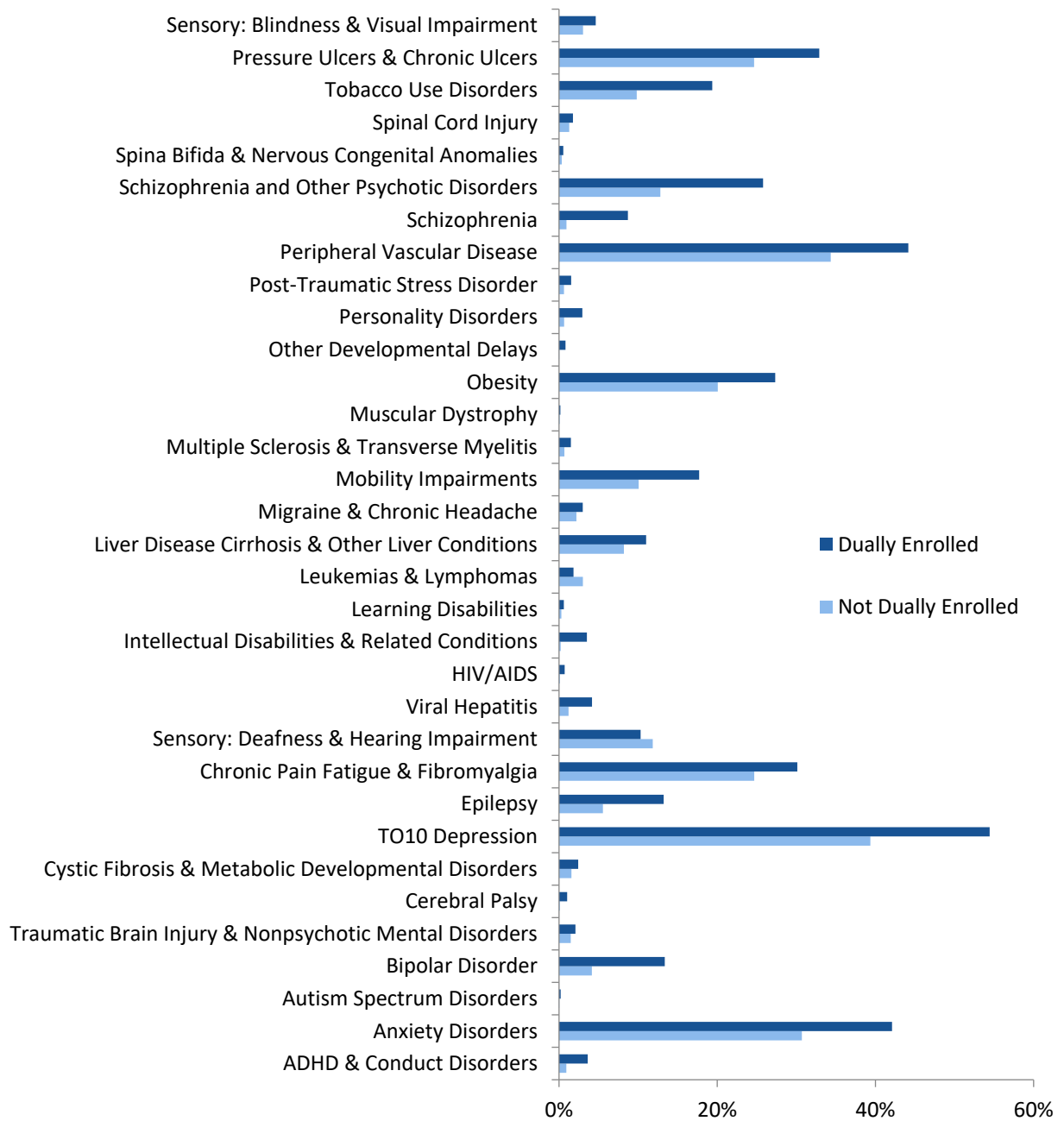
Figure 7.15. Prevalence of Mental, Behavioral and Neurodevelopmental Disorders by Dual Enrollment Status in the SNF Readmission Measure Cohort



Note: SNF=Skilled nursing facility; PTSD=post-traumatic stress disorder.

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Figure 7.16. Prevalence of Potentially Disabling Conditions by Dual Enrollment Status in the SNF Readmission Measure Cohort



Note: SNF=Skilled nursing facility.

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Table 7.9. Average Number of Functional Risk Factor Indicators per Beneficiary by Setting

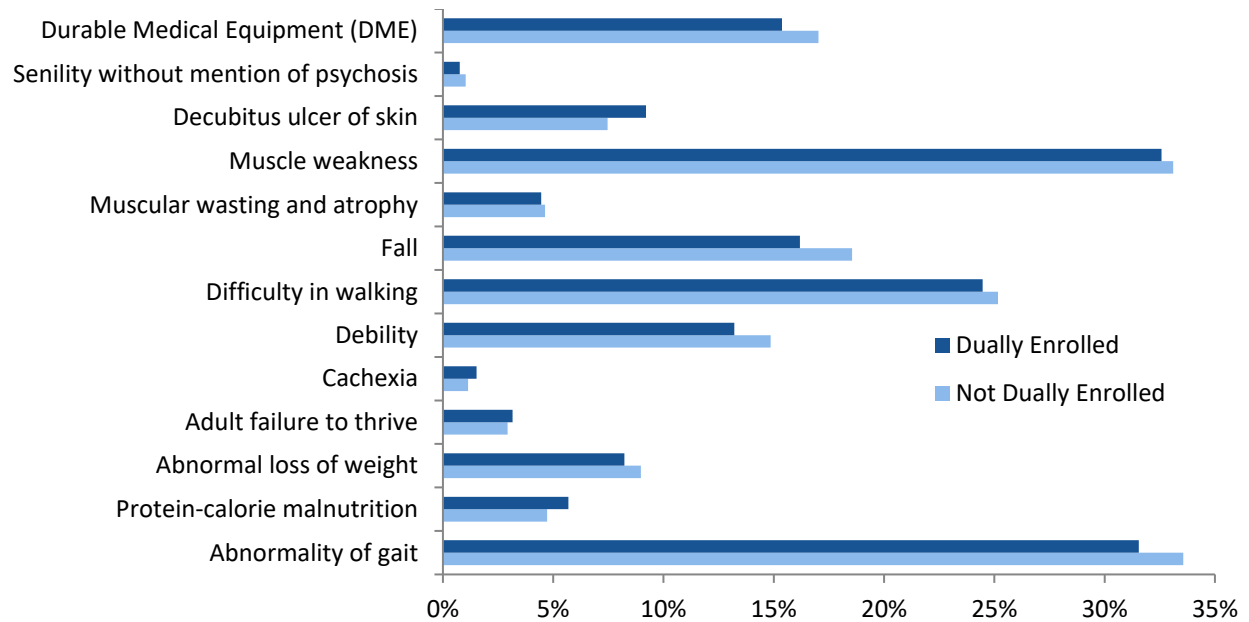
Functional Risk Factor	Hospital MSPB	Physician Practice Readmission	SNF Readmission	HHA ED Visits & Hospitalizations
Frailty-Related Diagnoses	1.16	5.28	2.13	1.60
Functional Dependence	4.78	0.88	7.09	5.43
Mental, Behavioral and Neurodevelopmental Disorders	1.10	2.41	1.58	1.10
Potentially Disabling Conditions	2.50	1.41	3.14	2.18

Note: Includes all beneficiaries, both dually enrolled and non-dually enrolled. MSPB=Medicare spending per beneficiary. SNF=skilled nursing facility; HHA=home health agency; ED=emergency department.

VIII. Home Health Agency Hospitalization or Emergency Department (ED) Use Measures

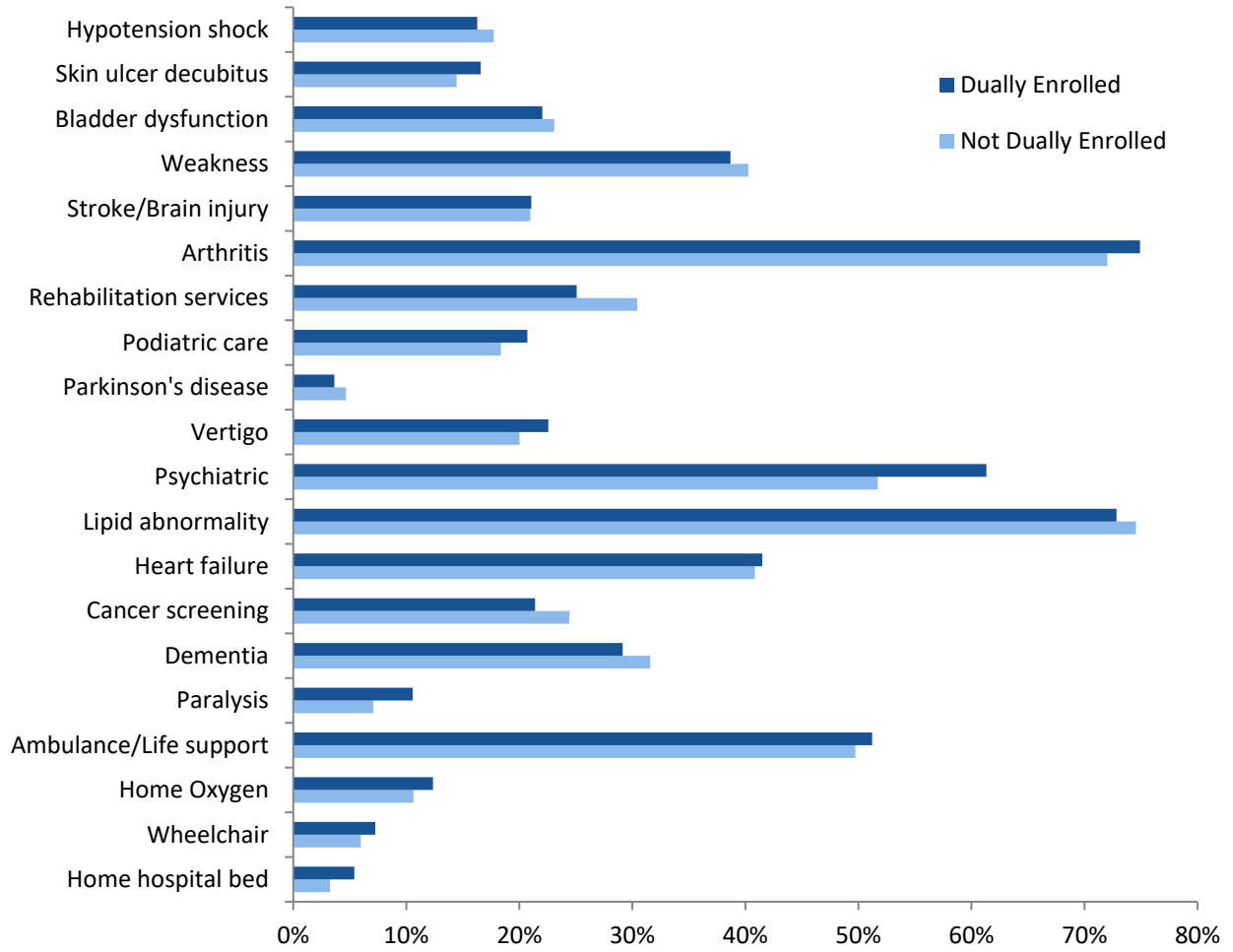
A. Prevalence of Beneficiary Functional Risk factors

Figure 7.17. Prevalence of Frailty Indicators by Dual Enrollment Status in the Home Health Hospitalization Measure Cohort



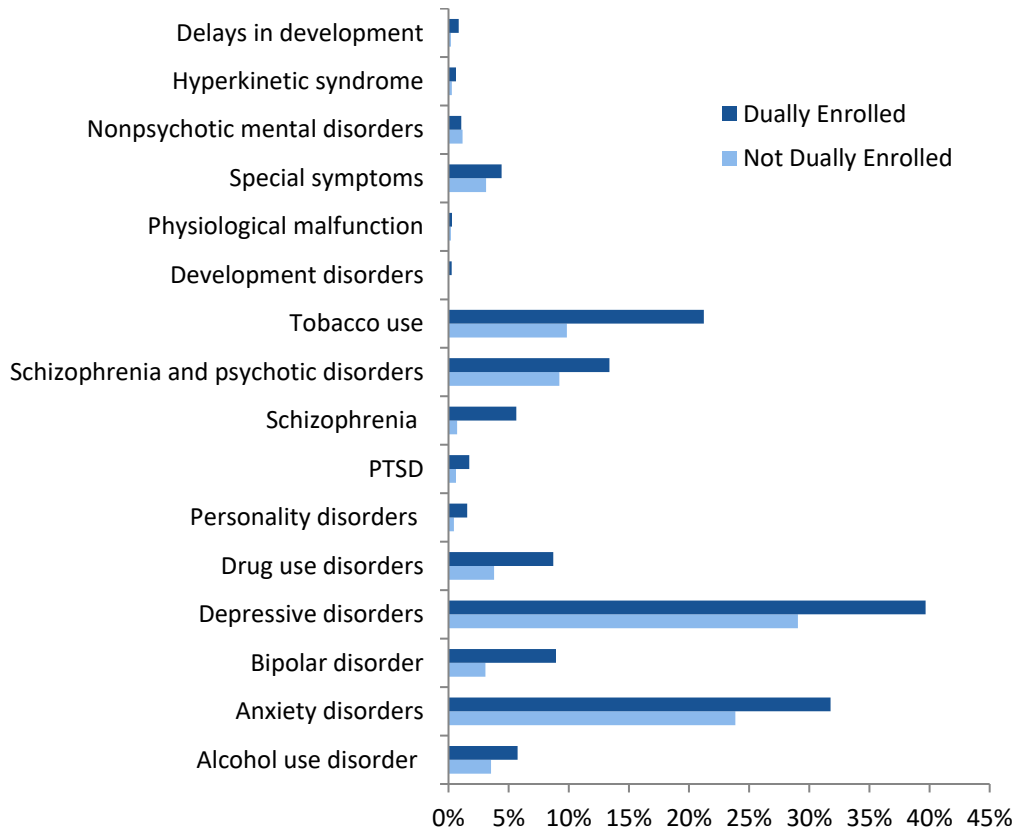
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Figure 7.18. Prevalence of Functional Dependence Indicators by Dual Enrollment Status in the Home Health ED Use or Hospitalization Measures Cohort



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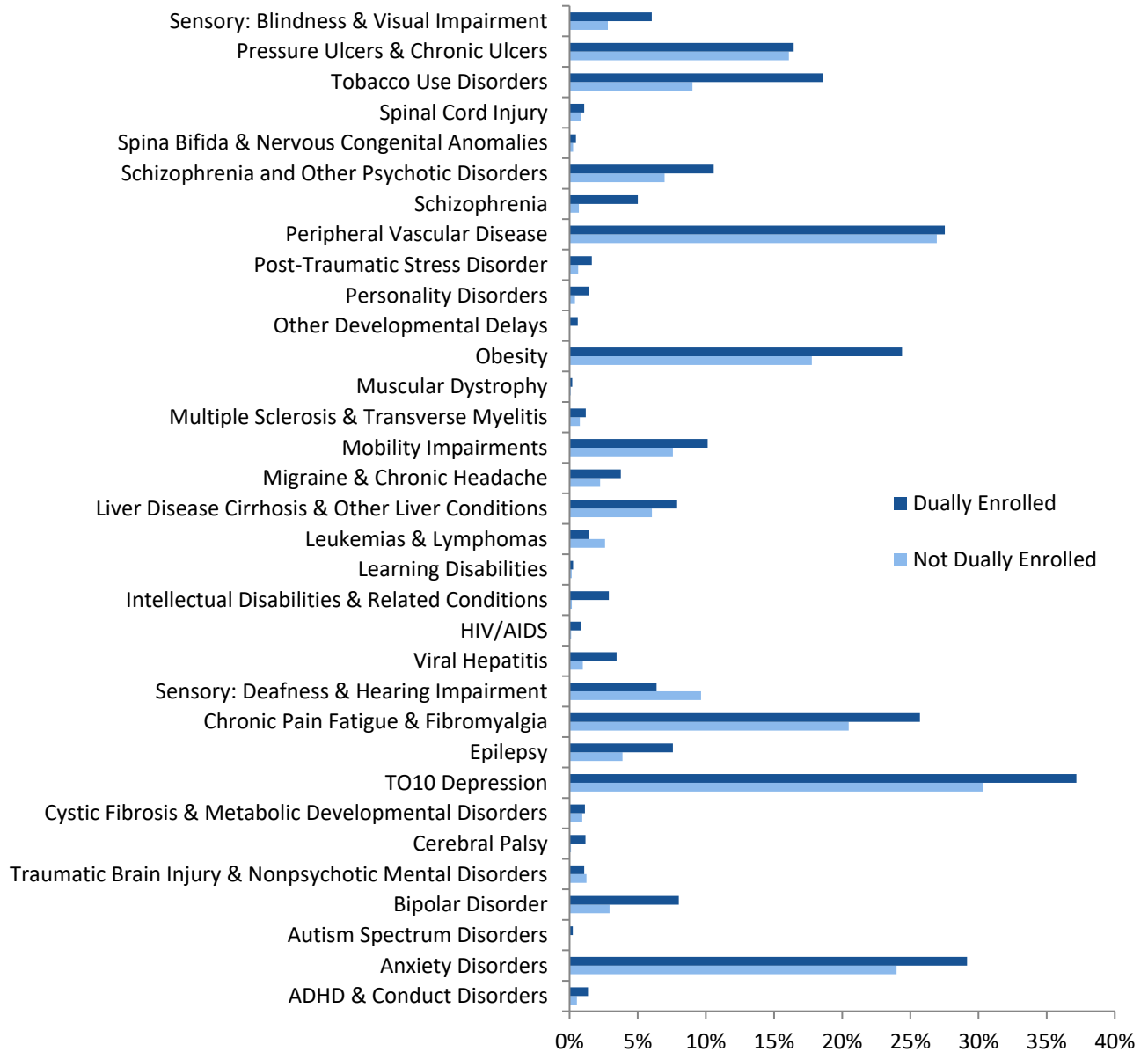
Figure 7.19. Prevalence of Mental, Behavioral and Neurodevelopmental Disorders by Dual Enrollment Status in the Home Health ED Use or Hospitalization Measures Cohort



Note: PTSD=post-traumatic stress disorder.

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Figure 7.20. Prevalence of Potentially Disabling Conditions by Dual Enrollment Status in the Home Health ED Use or Hospitalization Measures Cohort



Chapter 8. Survey-Based Functional and Social Risk Factors and Performance in Medicare Quality and Resource Use Measures Using the Medicare Current Beneficiary Survey (MCBS)

VII. Association between Risk Factors and Outcomes Evaluated

A. Total per Capita Costs (TPCC)

1. Association between Social Risk Factors and TPCC

Table 8.1. Association between Social Risk Factors and TPCC

Beneficiary Risk Factor	Raw		Risk adjusted	
	Coefficient	P-Value	Coefficient	P-Value
Claims-Based Social Risk Factors				
Dual Enrollment	\$6,700	<0.001	\$2,200	0.010
Race/Ethnicity				
Black	4,300	<0.001	750	0.423
Hispanic	900	0.602	-709	0.661
Other	-2,100	0.130	-2,500	0.003
White*				
Rural	150	0.842	200	0.732
MCBS Social Risk Factors				
Not Married	2,500	<0.001	350	0.481
Education				
Less than High School	5,050	<0.001	1,150	0.067
High School	3,350	<0.001	1,350	0.032
Less than Bachelor's Degree	2,001	0.003	1,100	0.072
Bachelor's Degree or More*				
Non-English Speaker	-80	0.953	-2,100	0.036
Lives Alone	1,700	0.008	800	0.155
Has Private Insurance	-2850	<0.001	-21	0.972
Does Not Own Home	4,900	<0.001	1,600	0.054
Income	-20	0.018	-5	0.136
Total Assets	-2	0.004	-1	0.084

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. TPCC=total per capita costs; MCBS=Medicare current beneficiary survey.

Chapter 8: Survey-Based Functional and Social Risk Factors and Performance in Medicare Quality and Resource Use Measures Using the Medicare Current Beneficiary Survey (MCBS)

Table 8.2. Association between Dual Enrollment, Marital Status, and TPCC

Social Risk Factor	Coefficient	P-Value
Dual Enrollment	\$2,300	0.016
Not Married	-65	0.904

Note: Includes TPCC measure risk adjustment. Bolded values are statistically significant at p<0.05. TPCC=total per capita costs.

Table 8.3. Association between Dual Enrollment, Education, and TPCC

Social Risk Factor	Coefficient	P-Value
Dual Enrollment	\$2,100	0.027
Education		
Less than High School	700	0.363
High School	1,150	0.079
Less than Bachelor's Degree	900	0.159
Bachelor's Degree or More*		

* indicates reference group in multi-value categorical variables.

Note: Includes TPCC measure risk adjustment. Bolded values are statistically significant at p<0.05. TPCC=total per capita costs.

Table 8.4. Association between Dual Enrollment, Language, and TPCC

Social Risk Factor	Coefficient	P-Value
Dual Enrollment	\$2,600	0.004
Non-English Speaker	-3,300	0.001

Note: Includes TPCC measure risk adjustment. Bolded values are statistically significant at p<0.05. TPCC=total per capita costs.

Table 8.5. Association between Dual Enrollment, Living Alone, and TPCC

Social Risk Factor	Coefficient	P-Value
Dual Enrollment	\$2,150	0.012
Lives Alone	750	0.185

Note: Includes TPCC measure risk adjustment. Bolded values are statistically significant at p<0.05. TPCC=total per capita costs.

Table 8.6. Association between Dual Enrollment, Private Health Insurance Coverage, and TPCC

Social Risk Factor	Coefficient	P-Value
Dual Enrollment	\$3,200	<0.001
Has Private Insurance	1,500	0.035

Note: Includes TPCC measure risk adjustment. Bolded values are statistically significant at p<0.05. TPCC=total per capita costs.

Table 8.7. Association between Dual Enrollment, Home Ownership, and TPCC

Social Risk Factor	Coefficient	P-Value
Dual Enrollment	\$2,500	0.023
Does Not Own Home	600	0.493

Note: Includes TPCC measure risk adjustment. Bolded values are statistically significant at p<0.05. TPCC=total per capita costs.

Chapter 8: Survey-Based Functional and Social Risk Factors and Performance in Medicare Quality and Resource Use Measures Using the Medicare Current Beneficiary Survey (MCBS)

Table 8.8. Association between Dual Enrollment, Income, and TPCC

Social Risk Factor	Coefficient	P-Value
Dual Enrollment	\$2,700	0.010
Income (in thousand \$)	-1.8	0.467

Note: Includes TPCC measure risk adjustment. Bolded values are statistically significant at p<0.05. TPCC=total per capita costs.

Table 8.9. Association between Dual Enrollment, Wealth, and TPCC

Social Risk Factor	Coefficient	P-Value
Dual Enrollment	\$2,700	0.011
Total Assets (in thousand \$)	-0.3	0.272

Note: Includes TPCC measure risk adjustment. Bolded values are statistically significant at p<0.05. TPCC=total per capita costs.

Table 8.10. Association between Claims-Based Social Risk Factors and TPCC

Social Risk Factor	Coefficient	P-Value
Dual Enrollment	\$2,500	0.004
Race/Ethnicity		
Black	400	0.729
Hispanic	-1,700	0.288
Other	-3,000	0.002
White*		
Rural	125	0.827

* indicates reference group in multi-value categorical variables.

Note: Includes TPCC measure risk adjustment. Bolded values are statistically significant at p<0.05. TPCC=total per capita costs.

Table 8.11. Association between Claims-Based Social Risk Factors, MCBS Social Risk Factors, and TPCC

Social Risk Factor	Coefficient	P-Value
Claims-Based Social Risk Factors		
Dual Enrollment	\$3,700	0.003
Race/Ethnicity		
Black	400	0.741
Hispanic	-500	0.858
Other	-2,400	0.075
White*		
Rural	\$00	0.767
MCBS Social Risk Factors		
Not Married	-2,000	0.047
Education		
Less than High School	1,200	0.188
High School	1,000	0.235
Less than Bachelor's Degree	700	0.367
Bachelor's Degree or More*		

Chapter 8: Survey-Based Functional and Social Risk Factors and Performance in Medicare Quality and Resource Use Measures Using the Medicare Current Beneficiary Survey (MCBS)

Social Risk Factor	Coefficient	P-Value
Non-English Speaker	-3,000	0.128
Lives Alone	1,900	0.031
Has Private Insurance	1,100	0.165
Does Not Own Home	1,200	0.203
Income	0.54	0.860
Total Assets	-0.22	0.455

* indicates reference group in multi-value categorical variables.

Note: Includes TPCC measure risk adjustment. Bolded values are statistically significant at p<0.05. TPCC=total per capita costs; MCBS=Medicare current beneficiary survey.

Table 8.12. Association Between Claims-Based Social Risk Factors, MCBS Social Risk Factors, Social Deprivation Index (SDI), and TPCC

Social Risk Factor	Coefficient	P-Value
Claims-Based Social Risk Factors		
Dual Enrollment	\$3,100	0.008
Race/Ethnicity		
Black	\$600	0.626
Hispanic	-\$2,300	0.056
Other	-\$2,600	0.039
White*	Ref.	
Rural	\$350	0.588
MCBS Social Risk Factors		
Not Married	-\$1,633	0.083
Education		
Less than High School	\$1,400	0.113
High School	\$700	0.369
Less than Bachelor's Degree	\$700	0.339
Bachelor's Degree or More*	Ref.	
Non-English Speaker	-850	0.496
Lives Alone	1,350	0.055
Has Private Insurance	1,120	0.160
Does Not Own Home	1,000	0.281
Income	0.29	0.924
Total Assets	-0.26	0.387
Social Deprivation Index	-200	0.617

* indicates reference group in multi-value categorical variables.

Note: Includes TPCC measure risk adjustment. Bolded values are statistically significant at p<0.05. TPCC=total per capita costs; MCBS=Medicare current beneficiary survey.

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4. Association between Functional Risk Factors and TPCC

Table 8.13. Association between Claims-Based Frailty Indicators, Activities of Daily Living (ADLs), Instrumental Activities of Daily Living (IADLs), and TPCC

Beneficiary Risk Factor	Coefficient	P-Value
Claims-Based Frailty (2 or more indicators)	\$2,857	0.001
Count of ADL Difficulties		
0*		
1	\$2,057	0.011
2 or More	\$4,424	<0.001
Difficulties with 1 or More IADLs	\$1,020	0.018

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. TPCC=total per capita costs; ADL=activities of daily living; IADL=instrumental activities of daily living.

Additional model results that include various combinations of medical risk factors including ADLs, IADLs, the claims-based frailty risk factors, and the General Health Status risk factor, and how these are associated with TPCC are below. These models show similar associations between medical risk factors and the TPCC.

Table 8.14. Association between ADLs and TPCC

Beneficiary Risk Factor	Coefficient	P-Value
Count of ADL Difficulties		
0*		
1	\$2,616	0.001
2 or More	\$5,263	<0.001

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. TPCC=total per capita costs; ADL=activities of daily living.

Table 8.15. Association between IADLs and TPCC

Beneficiary Risk Factor	Coefficient	P-Value
Difficulties with 1 or More IADLs	\$2,868	<0.001

Note: Bolded values are statistically significant at p<0.05. TPCC=total per capita costs.

Table 8.16. Association between ADLs, IADLs, and TPCC

Beneficiary Risk Factor	Coefficient	P-Value
Count of ADL Difficulties		
0*		
1	\$2,181	0.007
2 or More	\$4,587	<0.001
Difficulties with 1 or More IADLs	\$1,070	0.012

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. TPCC=total per capita costs; IADL=instrumental activities of daily living.

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Table 8.17. Association between Claims-Based Frailty Indicators and TPCC

Beneficiary Risk Factor	Coefficient	P-Value
Claims-Based Frailty (2 or more indicators)	\$3,570	<0.001

Note: Bolded values are statistically significant at p<0.05. TPCC=total per capita costs.

Table 8.18. Association between Claims-Based Frailty Indicators, ADLs, IADLs, General Health, and TPCC

Beneficiary Risk Factor	Coefficient	P-Value
Claims-Based Frailty (2 or more indicators)	\$3,027	<0.001
Count of ADL Difficulties		
0*		
1	\$1,624	0.034
2 or More	\$3,713	<0.001
Difficulties with 1 or More IADLs	\$353	0.477
General Health		
Excellent/Very Good*		
Good	\$1,562	<0.001
Fair/Poor	\$3,080	<0.001

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. TPCC=total per capita costs; ADL=activities of daily living; IADL=instrumental activities of daily living.

5. Association between Functional Risk Factors, Claims-Based Social Risk Factors, and TPCC

Table 8.19. Association between Dual Enrollment, ADLs, and TPCC

Beneficiary Risk Factor	Coefficient	P-Value
Dual Enrollment	\$1,319	0.119
Count of ADL Difficulties		
0*		
1	\$2,525	0.001
2 or More	\$5,013	<0.001

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. TPCC=total per capita costs; ADL=activities of daily living.

Table 8.20. Association between Dual Enrollment, IADLs, and TPCC

Beneficiary Risk Factor	Coefficient	P-Value
Dual Enrollment	\$1,542	0.079
Difficulties with 1 or More IADLs	\$2,624	<0.001

Note: Bolded values are statistically significant at p<0.05. TPCC=total per capita costs; IADL=instrumental activities of daily living.

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Table 8.21. Association between Dual Enrollment, ADLs, IADLs, and TPCC

Beneficiary Risk Factor	Coefficient	P-Value
Dual Enrollment	\$1,184	0.176
Count of ADL Difficulties		
0*		
1	\$2,156	0.007
2 or More	\$4,451	<0.001
Difficulties with 1 or More IADLs	\$930	0.043

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. TPCC=total per capita costs; ADL=activities of daily living; IADL=instrumental activities of daily living.

Table 8.22. Association between Dual Enrollment, Claims-Based Frailty Indicators, and TPCC

Beneficiary Risk Factor	Coefficient	P-Value
Dual Enrollment	\$2,175	0.011
Claims-Based Frailty (2 or more indicators)	\$3,541	<0.001

Note: Bolded values are statistically significant at p<0.05. TPCC=total per capita costs.

Table 8.23. Association between Dual Enrollment, Claims-Based Frailty Indicators, ADLs, IADLs, and TPCC

Beneficiary Risk Factor	Coefficient	P-Value
Dual Enrollment	\$1,209	0.167
Claims-Based Frailty (2 or more indicators)	\$2,876	0.001
Count of ADL Difficulties		
0*		
1	\$2,032	0.011
2 or More	\$4,284	<0.001
Difficulties with 1 or More IADLs	\$876	0.060

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. TPCC=total per capita costs; ADL=activities of daily living; IADL=instrumental activities of daily living.

Table 8.24. Association between Dual Enrollment, Claims-Based Frailty Indicators, ADLs, IADLs, General Health, and TPCC

Beneficiary Risk Factor	Coefficient	P-Value
Dual Enrollment	\$729	0.382
Claims-Based Frailty (2 or more indicators)	\$3,032	<0.001
Count of ADL Difficulties		
0*		
1	\$1,628	0.035

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Beneficiary Risk Factor	Coefficient	P-Value
2 or More	\$3,664	<0.001
Difficulties with 1 or More IADLs	\$296	0.570
General Health		
Excellent/Very Good*		
Good	\$1,528	<0.001
Fair/Poor	\$2,942	<0.001

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. TPCC=total per capita costs; ADL=activities of daily living; IADL=instrumental activities of daily living.

Table 8.25. Association between Dual Enrollment, Claims-Based Frailty Indicators, ADLs, IADLs, General Health, and TPCC

Beneficiary Risk Factor	Coefficient	P-Value
Dual Enrollment	\$729	0.382
Claims-Based Frailty (2 or more indicators)	\$3,032	<0.001
Count of ADL Difficulties		
0*		
1	\$1,628	0.035
2 or More	\$3,664	<0.001
Difficulties with 1 or More IADLs	\$296	0.570
General Health		
Excellent/Very Good*		
Good	\$1,528	<0.001
Fair/Poor	\$2,942	<0.001

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. TPCC=total per capita costs; ADL=activities of daily living; IADL=instrumental activities of daily living.

Table 8.26. Association between Dual Enrollment, ADLs, IADLs, Claims-Based Functional Risk Factors, General Health, and TPCC

Beneficiary Risk Factor	Coefficient	P-Value
Dual Enrollment	\$29	0.973
Count of ADL Difficulties		
0*		
1	\$1,406	0.070
2 or More	\$3,532	<0.001
Difficulties with 1 or More IADLs	-\$288	0.563
Claims-Based Functional Risk Factors (2 or more indicators)		
Frailty	\$1,883	0.021
Functional Dependence	\$830	0.106

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Beneficiary Risk Factor	Coefficient	P-Value
Mental, Behavioral and Neurodevelopmental Disorders	-\$3,682	<0.001
Potentially Disabling Conditions	\$8,978	<0.001
General Health		
Excellent/Very Good*		
Good	\$1,251	0.003
Fair/Poor	\$2,340	0.003

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. TPCC=total per capita costs; ADL=activities of daily living; IADL=instrumental activities of daily living.

6. Association between Functional Risk Factors, Social Risk Factors, and TPCC

Table 8.27. Association between Claims-Based Social Risk Factors, MCBS Social Risk Factors, the Social Deprivation Index (SDI), and TPCC

Beneficiary Risk Factor	Coefficient	P-Value
Claims-Based Social Risk Factors		
Dual Enrollment	\$3,139	0.008
Race/Ethnicity		
Black	\$622	0.626
Hispanic	-\$2,329	0.056
Other	-\$2,585	0.039
White*		
Rural	\$334	0.588
MCBS Social Risk Factors		
Not Married	-\$1,633	0.083
Education		
Less than High School	\$1,403	0.113
High School	\$716	0.370
Less than Bachelor's Degree	\$704	0.340
Bachelor's Degree or More*		
Non-English Speaker	-\$857	0.496
Lives Alone	\$1,337	0.055
Has Private Insurance	\$1,119	0.160
Does Not Own Home	\$1,016	0.281
Income	\$290	0.927
Total Assets	-\$260	0.387
Social Deprivation Index	-\$200	0.617

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. TPCC=total per capita costs; MCBS=Medicare current beneficiary survey.

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Table 8.28. Association between Claims-Based Social Risk Factors, MCBS Social Risk Factors, Claims-Based Frailty Indicators, ADLs, IADLs, and TPCC

Beneficiary Risk Factor	Coefficient	P-Value
Claims-Based Social Risk Factors		
Dual Enrollment	\$3,170	0.013
Race/Ethnicity		
Black	\$348	0.786
Hispanic	-\$767	0.757
Other	-\$2,763	0.037
White*		
Rural	\$244	0.706
MCBS Social Risk Factors		
Not Married	-\$2,246	0.023
Education		
Less than High School	\$727	0.444
High School	\$816	0.336
Less than Bachelor's Degree	\$365	0.613
Bachelor's Degree or More*		
Non-English Speaker	-\$2,499	0.190
Lives Alone	\$1,988	0.021
Has Private Insurance	\$1,284	0.121
Does Not Own Home	\$889	0.297
Income	\$980	0.752
Total Assets	-\$100	0.734
Claims-Based Frailty (2 or more indicators)	\$2,544	0.017
Count of ADL Difficulties		
0*		
1	\$2,257	0.042
2 or More	\$4,911	<0.001
Difficulties with 1 or More IADLs	\$1,052	0.079

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. TPCC=total per capita costs; MCBS=Medicare current beneficiary survey; ADL=activities of daily living; IADL=instrumental activities of daily living.

Table 8.29. Association between Claims-Based Social Risk Factors, MCBS Social Risk Factors, Claims-Based Frailty Indicators, ADLs, IADLs, General Health, and TPCC

Beneficiary Risk Factor	Coefficient	P-Value
Claims-Based Social Risk Factors		
Dual Enrollment	\$3,014	0.016
Race/Ethnicity		
Black	\$117	0.925

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Beneficiary Risk Factor	Coefficient	P-Value
Hispanic	-\$1,147	0.646
Other	-\$2,884	0.024
White*		
Rural	\$232	0.721
MCBS Social Risk Factors		
Not Married	-\$2,230	0.023
Education		
Less than High School	\$492	0.603
High School	\$691	0.428
Less than Bachelor's Degree	\$230	0.755
Bachelor's Degree or More*		
Non-English Speaker	-\$2,642	0.172
Lives Alone	\$2,063	0.017
Has Private Insurance	\$1,691	0.050
Does Not Own Home	\$898	0.293
Income	\$1,500	0.642
Total Assets	\$10	0.973
Claims-Based Frailty (2 or more indicators)	\$2,691	0.012
Count of ADL Difficulties		
0*		
1	\$1,761	0.092
2 or More	\$4,115	<0.001
Difficulties with 1 or More IADLs	\$394	0.548
General Health		
Excellent/Very Good*		
Good	\$1,696	0.001
Fair/Poor	\$3,708	<0.001

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. TPCC=total per capita costs; MCBS=Medicare current beneficiary survey; ADL=activities of daily living; IADL=instrumental activities of daily living.

Table 8.30. Association between Claims-Based Social Risk Factors, MCBS Social Risk Factors, Claims-Based Functional Risk Factors, ADLs, IADLs, General Health, and TPCC

Beneficiary Risk Factor	Coefficient	P-Value
Claims-Based Social Risk Factors		
Dual Enrollment	\$2,520	0.061
Race/Ethnicity		
Black	\$735	0.554
Hispanic	-\$636	0.797
Other	-\$2,258	0.093

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Beneficiary Risk Factor	Coefficient	P-Value
White*		
Rural	\$190	0.767
MCBS Social Risk Factors		
Not Married	-\$2,519	0.010
Education		
Less than High School	\$284	0.760
High School	\$486	0.580
Less than Bachelor's Degree	\$107	0.883
Bachelor's Degree or More*		
Non-English Speaker	-\$2,295	0.243
Lives Alone	\$2,241	0.008
Has Private Insurance	\$1,807	0.031
Does Not Own Home	\$806	0.332
Income	\$1,230	0.692
Total Assets	\$60	0.821
Claims-Based Functional Risk Factors (2 or more indicators)		
Frailty	\$1,686	0.101
Functional Dependence	\$474	0.411
Mental, Behavioral and Neurodevelopmental Disorders	-\$3,851	<0.001
Potentially Disabling Conditions	\$8,510	<0.001
Count of ADL Difficulties		
0*		
1	\$1,497	0.158
2 or More	\$4,034	<0.001
Difficulties with 1 or More IADLs	-\$91	0.882
General Health		
Excellent/Very Good*		
Good	\$1,504	0.003
Fair/Poor	\$3,140	0.001

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. TPCC=total per capita costs; MCBS=Medicare current beneficiary survey; ADL=activities of daily living; IADL=instrumental activities of daily living.

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B. All-Cause Hospital Readmissions

1. Surgical Cohort

a. Association between Social Risk Factors and All-Cause Hospital Readmissions for the Surgical Cohort

Table 8.31. Association between Social Risk Factors and All-Cause Hospital Readmissions for the Surgical Cohort

Beneficiary Risk Factor	Raw		Risk adjusted	
	Odds Ratio	P-Value	Odds Ratio	P-Value
Claims-Based Social Risk Factors				
Dual Enrollment	1.89	0.002	1.43	0.114
Race/Ethnicity				
Black	1.42	0.071	1.14	0.355
Hispanic	1.24	0.507	1.14	0.676
Other	0.65	0.313	0.82	0.697
White*				
Rural	0.86	0.278	0.86	0.232
MCBS Social Risk Factors				
Not Married	1.54	0.004	1.37	0.037
Education				
Less than High School	1.16	0.323	1.00	0.997
High School	1.23	0.023	1.17	0.087
Less than Bachelor's Degree	0.80	0.120	0.86	0.262
Bachelor's Degree or More*				
Non-English Speaker	1.13	0.689	1.12	0.745
Lives Alone	1.36	0.035	1.25	0.083
Has Private Insurance	0.66	0.035	0.83	0.337
Does Not Own Home	2.12	0.004	1.61	0.063
Income	0.99	0.006	0.99	0.040
Total Assets	1.00	0.069	1.00	0.147

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. MCBS=Medicare current beneficiary survey.

Table 8.32. Association between Claims-Based Social Risk Factors and All-Cause Hospital Readmissions for the Surgical Cohort

Social Risk Factor	Odds Ratio	P-Value
Dual Enrollment	1.39	0.155
Race/Ethnicity		
Black	1.20	0.267
Hispanic	1.20	0.599
Other	0.73	0.569

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Social Risk Factor	Odds Ratio	P-Value
White*		
Rural	0.82	0.174

* indicates reference group in multi-value categorical variables.

Note: Includes measure risk adjustment. Bolded values are statistically significant at p<0.05.

Table 8.33. Association between Claims-Based Social Risk Factors, MCBS Social Risk Factors, and All-Cause Hospital Readmissions for the Surgical Cohort

Social Risk Factor	Odds Ratio	P-Value
Claims-Based Social Risk Factors		
Dual Enrollment	1.78	0.176
Race/Ethnicity		
Black	1.08	0.772
Hispanic	0.94	0.902
Other	1.26	0.736
White*		
Rural	1.11	0.593
MCBS Social Risk Factors		
Not Married	1.46	0.160
Education		
Less than High School	1.04	0.891
High School	1.16	0.362
Less than Bachelor's Degree	0.73	0.167
Bachelor's Degree or More*		
Non-English Speaker	0.79	0.636
Lives Alone	0.96	0.878
Has Private Insurance	1.77	0.085
Does Not Own Home	1.06	0.845
Income	1.00	0.678
Total Assets	1.00	0.552

* indicates reference group in multi-value categorical variables.

Note: Includes measure risk adjustment. Bolded values are statistically significant at p<0.05. MCBS=Medicare current beneficiary survey.

Table 8.34. Association Between Claims-Based Social Risk Factors, MCBS Social Risk Factors, Social Deprivation Index (SDI), and All-Cause Hospital Readmissions for the Surgical Cohort

Social Risk Factor	Odds Ratio	P-Value
Claims-Based Social Risk Factors		
Dual Enrollment	1.73	0.207
Race/Ethnicity		
Black	1.32	0.207
Hispanic	0.67	0.286

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Other	1.28	0.444
White*		
Rural	1.14	0.490
MCBS Social Risk Factors		
Not Married	1.42	0.198
Education		
Less than High School	1.09	0.719
High School	1.11	0.518
Less than Bachelor's Degree	0.74	0.179
Bachelor's Degree or More*		
Non-English Speaker	1.13	0.810
Lives Alone	0.95	0.838
Has Private Insurance	1.79	0.083
Does Not Own Home	1.02	0.939
Income	1.00	0.641
Total Assets	1.00	0.536
Social Deprivation Index	0.94	0.540

* indicates reference group in multi-value categorical variables.

Note: Includes measure risk adjustment. Bolded values are statistically significant at p<0.05. MCBS=Medicare current beneficiary survey.

b. Association between Functional Risk Factors and All-Cause Hospital Readmissions for the Surgical Cohort

Table 8.35. Association between Claims-Based Frailty Indicators, ADLs, IADLs, and All-Cause Hospital Readmissions for the Surgical Cohort

Beneficiary Risk Factor	Odds Ratio	P-Value
Claims-Based Frailty (2 or more indicators)	1.26	0.308
Count of ADL Difficulties		
0*		
1	0.94	0.632
2 or More	1.10	0.443
Difficulties with 1 or More IADLs	1.36	0.062

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. ADL=activities of daily living; IADL=instrumental activities of daily living.

Table 8.36. Association between Dual Enrollment, ADLs, IADLs, and All-Cause Hospital Readmissions for the Surgical Cohort

Beneficiary Risk Factor	Odds Ratio	P-Value
Dual Enrollment	1.37	0.172
Count of ADL Difficulties		
0*		

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Beneficiary Risk Factor	Odds Ratio	P-Value
1	0.96	0.778
2 or More	1.16	0.214
Difficulties with 1 or More IADLs	1.36	0.062

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. ADL=activities of daily living; IADL=instrumental activities of daily living.

Table 8.37. Association between IADLs and All-Cause Hospital Readmissions for the Surgical Cohort

Beneficiary Risk Factor	Odds Ratio	P-Value
Difficulties with 1 or More IADLs	1.43	0.017

Note: Bolded values are statistically significant at p<0.05. IADL=instrumental activities of daily living.

Table 8.38. Association between ADLs, IADLs, and All-Cause Hospital Readmissions for the Surgical Cohort

Beneficiary Risk Factor	Odds Ratio	P-Value
Count of ADL Difficulties		
0*		
1	0.94	0.655
2 or More	1.10	0.392
Difficulties with 1 or More IADLs	1.36	0.061

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. ADL=activities of daily living; IADL=instrumental activities of daily living.

Table 8.39. Association between Claims-Based Frailty Indicators and All-Cause Hospital Readmissions for the Surgical Cohort

Beneficiary Risk Factor	Odds Ratio	P-Value
Claims-Based Frailty (2 or more indicators)	1.28	0.268

Note: Bolded values are statistically significant at p<0.05.

Table 8.40. Association between Claims-Based Frailty Indicators, ADLs, IADLs, General Health, and All-Cause Hospital Readmissions for the Surgical Cohort

Beneficiary Risk Factor	Odds Ratio	P-Value
Claims-Based Frailty (2 or more indicators)	1.22	0.395
Count of ADL Difficulties		
0*		
1	0.94	0.655
2 or More	1.04	0.733
Difficulties with 1 or More IADLs	1.23	0.219
General Health		
Excellent/Very Good*		
Good	0.95	0.554

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Beneficiary Risk Factor	Odds Ratio	P-Value
Fair/Poor	1.33	0.006

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. ADL=activities of daily living; IADL=instrumental activities of daily living.

Table 8.41. Association between Claims-Based Frailty Indicators, ADLs, IADLs, and All-Cause Hospital Readmissions for the Surgical Cohort

Beneficiary Risk Factor	Odds Ratio	P-Value
Claims-Based Frailty (2 or more indicators)	1.26	0.308
Count of ADL Difficulties		
0*		
1	0.94	0.632
2 or More	1.10	0.443
Difficulties with 1 or More IADLs	1.36	0.062

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. ADL=activities of daily living; IADL=instrumental activities of daily living.

Table 8.42. Association between Dual Enrollment, Claims-Based Functional Risk Factors, ADLs, IADLs, General Health, and All-Cause Hospital Readmissions for the Surgical Cohort

Beneficiary Risk Factor	Odds Ratio	P-Value
Dual Enrollment	1.26	0.327
Claims-Based Functional Risk Factors (2 or more indicators)		
Frailty	1.16	0.498
Functional Dependence	1.12	0.669
Mental, Behavioral and Neurodevelopmental Disorders	0.90	0.681
Potentially Disabling Conditions	1.99	<0.001
Count of ADL Difficulties		
0*		
1	0.93	0.556
2 or More	1.00	0.997
Difficulties with 1 or More IADLs	1.36	0.062
General Health		
Excellent/Very Good*		
Good	0.96	0.622
Fair/Poor	1.26	0.021

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. ADL=activities of daily living; IADL=instrumental activities of daily living.

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c. Association between Functional Risk Factors, Claims-Based Social Risk Factors and All-Cause Hospital Readmissions for the Surgical Cohort

Table 8.43. Association between Dual Enrollment, ADLs, and All-Cause Hospital Readmissions for the Surgical Cohort

Beneficiary Risk Factor	Odds Ratio	P-Value
Dual Enrollment	1.37	0.172
Count of ADL Difficulties		
0*		
1	0.96	0.778
2 or More	1.16	0.214

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. ADL=activities of daily living.

Table 8.44. Association between Dual Enrollment, IADLs, and All-Cause Hospital Readmissions for the Surgical Cohort

Beneficiary Risk Factor	Odds Ratio	P-Value
Dual Enrollment	1.34	0.193
Difficulties with 1 or More IADLs	1.38	0.032

Note: Bolded values are statistically significant at p<0.05. IADL=instrumental activities of daily living.

Table 8.45. Association between Dual Enrollment, ADLs, IADLs, and All-Cause Hospital Readmissions for the Surgical Cohort

Beneficiary Risk Factor	Odds Ratio	P-Value
Dual Enrollment	1.33	0.221
Count of ADL Difficulties		
0*		
1	0.95	0.678
2 or More	1.09	0.475
Difficulties with 1 or More IADLs	1.32	0.084

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. ADL=activities of daily living; IADL=instrumental activities of daily living.

Table 8.46. Association between Dual Enrollment, Claims-Based Frailty Indicators, and All-Cause Hospital Readmissions for the Surgical Cohort

Beneficiary Risk Factor	Odds Ratio	P-Value
Dual Enrollment	1.42	0.116
Claims-Based Frailty (2 or more indicators)	1.28	0.264

Note: Bolded values are statistically significant at p<0.05.

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Table 8.47. Association between Dual Enrollment, Claims-Based Frailty Indicators, ADLs, IADLs, and All-Cause Hospital Readmissions for the Surgical Cohort

Beneficiary Risk Factor	Odds Ratio	P-Value
Dual Enrollment	1.33	0.218
Claims-Based Frailty (2 or more indicators)	1.26	0.295
Count of ADL Difficulties		
0*		
1	0.94	0.656
2 or More	1.08	0.530
Difficulties with 1 or More IADLs	1.32	0.087

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. ADL=activities of daily living; IADL=instrumental activities of daily living.

Table 8.48. Association between Dual Enrollment, Claims-Based Frailty Indicators, ADLs, IADLs, General Health, and All-Cause Hospital Readmissions for the Surgical Cohort

Beneficiary Risk Factor	Odds Ratio	P-Value
Dual Enrollment	1.26	0.316
Claims-Based Frailty (2 or more indicators)	1.22	0.383
Count of ADL Difficulties		
0*		
1	0.95	0.673
2 or More	1.03	0.802
Difficulties with 1 or More IADLs	1.21	0.256
General Health		
Excellent/Very Good*		
Good	0.95	0.575
Fair/Poor	1.31	0.008

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. ADL=activities of daily living; IADL=instrumental activities of daily living.

d. Association between Functional Risk Factors, Social Risk Factors, and All-Cause Hospital Readmissions for the Surgical Cohort

Table 8.49. Association between Claims-Based Social Risk Factors, MCBS Social Risk Factors, SDI, and All-Cause Hospital Readmissions for the Surgical Cohort

Beneficiary Risk Factor	Odds Ratio	P-Value
Claims-Based Social Risk Factors		
Dual Enrollment	1.73	0.207
Race/Ethnicity		
Black	1.32	0.286

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Beneficiary Risk Factor	Odds Ratio	P-Value
Hispanic	0.67	0.444
Other	1.28	0.709
White*		
Rural	1.14	0.490
MCBS Social Risk Factors		
Not Married	1.42	0.198
Education		
Less than High School	1.09	0.719
High School	1.11	0.518
Less than Bachelor's Degree	0.74	0.179
Bachelor's Degree or More*		
Non-English Speaker	0.95	0.838
Lives Alone	1.79	0.083
Has Private Insurance	1.02	0.939
Does Not Own Home	1.00	0.641
Income (in thousands \$)	1.00	0.536
Total Assets (in thousands \$)	0.95	0.838
Social Deprivation Index	0.94	0.540

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at $p < 0.05$. MCBS=Medicare current beneficiary survey.

Table 8.50. Association between Claims-Based Social Risk Factors, MCBS Social Risk Factors, Claims-Based Frailty Indicators, ADLs, IADLs, and All-Cause Hospital Readmissions for the Surgical Cohort

Beneficiary Risk Factor	Odds Ratio	P-Value
Claims-Based Social Risk Factors		
Dual Enrollment	1.69	0.227
Race/Ethnicity		
Black	1.08	0.753
Hispanic	1.04	0.939
Other	1.13	0.852
White*		
Rural	1.07	0.744
MCBS Social Risk Factors		
Not Married	1.43	0.174
Education		
Less than High School	1.05	0.838
High School	1.17	0.338
Less than Bachelor's Degree	0.72	0.156
Bachelor's Degree or More*		
Non-English Speaker	0.71	0.501
Lives Alone	0.99	0.966

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Has Private Insurance	1.74	0.083
Does Not Own Home	1.05	0.865
Income (in thousands \$)	1.00	0.698
Total Assets (in thousands \$)	1.00	0.588
Claims-Based Frailty (2 or more indicators)	1.38	0.288
Count of ADL Difficulties		
0*		
1	0.96	0.818
2 or More	1.10	0.604
Difficulties with 1 or More IADLs	1.13	0.638

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. MCBS=Medicare current beneficiary survey; ADL=activities of daily living; IADL=instrumental activities of daily living.

Table 8.51. Association between Claims-Based Social Risk Factors, MCBS Social Risk Factors, Claims-Based Frailty Indicators, ADLs, IADLs, General Health, and All-Cause Hospital Readmissions for the Surgical Cohort

Beneficiary Risk Factor	Odds Ratio	P-Value
Claims-Based Social Risk Factors		
Dual Enrollment	1.53	0.331
Race/Ethnicity		
Black	1.02	0.931
Hispanic	0.99	0.977
Other	1.29	0.699
White*		
Rural	1.08	0.681
MCBS Social Risk Factors		
Not Married	1.52	0.109
Education		
Less than High School	1.05	0.835
High School	1.15	0.397
Less than Bachelor's Degree	0.73	0.172
Bachelor's Degree or More*		
Non-English Speaker	0.69	0.477
Lives Alone	0.96	0.880
Has Private Insurance	1.71	0.091
Does Not Own Home	1.03	0.937
Income (in thousands \$)	1.00	0.749
Total Assets (in thousands \$)	1.00	0.578
Claims-Based Frailty (2 or more indicators)	1.32	0.381
Count of ADL Difficulties		

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Beneficiary Risk Factor	Odds Ratio	P-Value
0*		
1	0.95	0.815
2 or More	1.04	0.811
Difficulties with 1 or More IADLs	1.00	0.996
General Health		
Excellent/Very Good*		
Good	0.91	0.574
Fair/Poor	1.42	0.020

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. MCBS=Medicare current beneficiary survey; ADL=activities of daily living; IADL=instrumental activities of daily living.

Table 8.52. Association between Claims-Based Social Risk Factors, MCBS Social Risk Factors, Claims-Based Functional Risk Factors, ADLs, IADLs, General Health, and All-Cause Hospital Readmissions for the Surgical Cohort

Beneficiary Risk Factor	Odds Ratio	P-Value
Claims-Based Social Risk Factors		
Dual Enrollment	1.60	0.329
Race/Ethnicity		
Black	0.94	0.831
Hispanic	0.98	0.978
Other	1.40	0.594
White*		
Rural	1.12	0.573
MCBS Social Risk Factors		
Not Married	1.59	0.087
Education		
Less than High School	0.94	0.831
High School	0.98	0.978
Less than Bachelor's Degree	1.40	0.594
Bachelor's Degree or More*		
Non-English Speaker	0.67	0.453
Lives Alone	0.92	0.758
Has Private Insurance	1.72	0.111
Does Not Own Home	0.99	0.986
Income (in thousands \$)	1.00	0.676
Total Assets (in thousands \$)	1.00	0.690
Claims-Based Functional Risk Factors (2 or more indicators)		
Frailty	1.17	0.600
Functional Dependence	1.33	0.509

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Beneficiary Risk Factor	Odds Ratio	P-Value
Mental, Behavioral and Neurodevelopmental Disorders	1.07	0.850
Potentially Disabling Conditions	1.93	0.010
Count of ADL Difficulties		
0*		
1	0.92	0.698
2 or More	1.01	0.948
Difficulties with 1 or More IADLs	0.99	0.967
General Health		
Excellent/Very Good*		
Good	0.92	0.634
Fair/Poor	1.37	0.039

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. MCBS=Medicare current beneficiary survey; ADL=activities of daily living; IADL=instrumental activities of daily living.

7. Medical Cohort

a. Association between Social Risk Factors and All-Cause Hospital Readmissions for the Medical Cohort

Table 8.53. Association between Social Risk Factors and All-Cause Hospital Readmissions for the Medical Cohort

Beneficiary Risk Factor	Raw		Risk adjusted	
	Odds Ratio	P-Value	Odds Ratio	P-Value
Claims-Based Social Risk Factors				
Dual Enrollment	1.30	0.005	1.13	0.300
Race/Ethnicity				
Black	1.16	0.136	1.10	0.256
Hispanic	0.77	0.152	0.75	0.108
Other	1.51	0.012	1.56	0.007
White*				
Rural	0.84	0.028	0.83	0.035
MCBS Social Risk Factors				
Not Married	1.01	0.948	1.06	0.443
Education				
Less than High School	1.12	0.113	1.06	0.379
High School	0.99	0.913	1.02	0.795
Less than Bachelor's Degree	0.90	0.217	0.90	0.162
Bachelor's Degree or More*				
Non-English Speaker	0.77	0.334	0.78	0.380
Lives Alone	0.87	0.215	0.90	0.285
Has Private Insurance	0.78	0.003	0.85	0.028

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Beneficiary Risk Factor	Raw		Risk adjusted	
	Odds Ratio	P-Value	Odds Ratio	P-Value
Does Not Own Home	1.16	0.185	1.10	0.398
Income	1.00	0.085	1.00	0.147
Total Assets	1.00	0.565	1.00	0.861

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at $p < 0.05$. MCBS=Medicare current beneficiary survey.

Table 8.54. Association between Claims-Based Social Risk Factors and All-Cause Hospital Readmissions for the Medical Cohort

Social Risk Factor	Odds Ratio	P-Value
Dual Enrollment	1.08	0.494
Race/Ethnicity		
Black	1.08	0.476
Hispanic	0.65	0.043
Other	1.74	0.003
White*		
Rural	0.78	0.002

* indicates reference group in multi-value categorical variables.

Note: Includes measure risk adjustment. Bolded values are statistically significant at $p < 0.05$.

Table 8.55. Association between Claims-Based Social Risk Factors, MCBS Social Risk Factors, and All-Cause Hospital Readmissions for the Medical Cohort

Social Risk Factor	Odds Ratio	P-Value
Claims-Based Social Risk Factors		
Dual Enrollment	0.86	0.406
Race/Ethnicity		
Black	1.13	0.628
Hispanic	0.69	0.443
Other	1.51	0.146
White*		
Rural	0.75	0.028
MCBS Social Risk Factors		
Not Married	0.95	0.809
Education		
Less than High School	0.95	0.809
High School	1.02	0.871
Less than Bachelor's Degree	0.91	0.509
Bachelor's Degree or More*	0.91	0.417
Non-English Speaker		
Lives Alone	0.61	0.378
Has Private Insurance	0.73	0.096

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Social Risk Factor	Odds Ratio	P-Value
Does Not Own Home	0.92	0.648
Income	1.09	0.623
Total Assets	1.00	0.123

* indicates reference group in multi-value categorical variables.

Note: Includes measure risk adjustment. Bolded values are statistically significant at p<0.05. MCBS=Medicare current beneficiary survey.

Table 8.56. Association Between Claims-Based Social Risk Factors, MCBS Social Risk Factors, Social Deprivation Index (SDI), and All-Cause Hospital Readmissions for the Medical Cohort

Social Risk Factor	Odds Ratio	P-Value
Claims-Based Social Risk Factors		
Dual Enrollment	0.88	0.502
Race/Ethnicity		
Black	1.15	0.556
Hispanic	0.72	0.495
Other	1.46	0.194
White*		
Rural	0.79	0.076
MCBS Social Risk Factors		
Not Married	0.96	0.851
Education		
Less than High School	1.02	0.876
High School	0.92	0.521
Less than Bachelor's Degree	0.90	0.361
Bachelor's Degree or More*	Ref.	
Non-English Speaker	0.61	0.375
Lives Alone	0.73	0.091
Has Private Insurance	0.91	0.636
Does Not Own Home	1.08	0.660
Income	1.00	0.128
Total Assets	1.00	0.576
Social Deprivation Index	0.91	0.283

* indicates reference group in multi-value categorical variables.

Note: Includes measure risk adjustment. Bolded values are statistically significant at p<0.05. MCBS=Medicare current beneficiary survey.

b. Association between Functional Risk Factors and All-Cause Hospital Readmissions for the Medical Cohort

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Table 8.57. Association between Claims-Based Frailty Indicators, ADLs, IADLs, and All-Cause Hospital Readmissions for the Medical Cohort

Beneficiary Risk Factor	Odds Ratio	P-Value
Claims-Based Frailty (2 or more indicators)	1.32	0.003
Count of ADL Difficulties		
0*		
1	0.91	0.249
2 or More	1.06	0.484
Difficulties with 1 or More IADLs	1.14	0.399

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at $p < 0.05$. ADL=activities of daily living; IADL=instrumental activities of daily living.

Table 8.58. Association between Dual Enrollment, ADLs, IADLs, and All-Cause Hospital Readmissions for the Medical Cohort

Beneficiary Risk Factor	Odds Ratio	P-Value
Dual Enrollment	1.05	0.677
Count of ADL Difficulties		
0*		
1	0.91	0.229
2 or More	1.08	0.362
Difficulties with 1 or More IADLs	1.14	0.396

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at $p < 0.05$. ADL=activities of daily living; IADL=instrumental activities of daily living.

Table 8.59. Association between IADLs and All-Cause Hospital Readmissions for the Medical Cohort

Beneficiary Risk Factor	Odds Ratio	P-Value
Difficulties with 1 or More IADLs	1.17	0.232

Note: Bolded values are statistically significant at $p < 0.05$. IADL=instrumental activities of daily living.

Table 8.60. Association between ADLs, IADLs, and All-Cause Hospital Readmissions for the Medical Cohort

Beneficiary Risk Factor	Odds Ratio	P-Value
Count of ADL Difficulties		
0*		
1	0.91	0.229
2 or More	1.08	0.358
Difficulties with 1 or More IADLs	1.14	0.387

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at $p < 0.05$.

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Table 8.61. Association between Claims-Based Frailty Indicators and All-Cause Hospital Readmissions for the Medical Cohort

Beneficiary Risk Factor	Odds Ratio	P-Value
Claims-Based Frailty (2 or more indicators)	1.38	0.001

Note: Bolded values are statistically significant at p<0.05.

Table 8.62. Association between Claims-Based Frailty Indicators, ADLs, IADLs, General Health, and All-Cause Hospital Readmissions for the Medical Cohort

Beneficiary Risk Factor	Odds Ratio	P-Value
Claims-Based Frailty (2 or more indicators)	1.32	0.002
Count of ADL Difficulties		
0*		
1	0.91	0.249
2 or More	1.04	0.687
Difficulties with 1 or More IADLs	1.08	0.600
General Health		
Excellent/Very Good*		
Good	0.99	0.805
Fair/Poor	1.18	0.026

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. ADL=activities of daily living; IADL=instrumental activities of daily living.

c. Association between Functional Risk Factors, Claims-Based Social Risk Factors and All-Cause Hospital Readmissions for the Medical Cohort

Table 8.63. Association between Dual Enrollment, ADLs, and All-Cause Hospital Readmissions for the Medical Cohort

Beneficiary Risk Factor	Odds Ratio	P-Value
Dual Enrollment	1.05	0.633
Count of ADL Difficulties		
0*		
1	0.92	0.278
2 or More	1.11	0.145

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. ADL=activities of daily living.

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Table 8.64. Association between Dual Enrollment, IADLs, and All-Cause Hospital Readmissions for the Medical Cohort

Beneficiary Risk Factor	Odds Ratio	P-Value
Dual Enrollment	1.06	0.638
Difficulties with 1 or More IADLs	1.16	0.245

Note: Bolded values are statistically significant at p<0.05. IADL=instrumental activities of daily living.

Table 8.65. Association between Dual Enrollment, ADLs, IADLs, and All-Cause Hospital Readmissions for the Medical Cohort

Beneficiary Risk Factor	Odds Ratio	P-Value
Dual Enrollment	1.05	0.677
Count of ADL Difficulties		
0*		
1	0.91	0.229
2 or More	1.08	0.362
Difficulties with 1 or More IADLs	1.14	0.396

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. ADL=activities of daily living; IADL=instrumental activities of daily living.

Table 8.66. Association between Dual Enrollment, Claims-Based Frailty Indicators, and All-Cause Hospital Readmissions for the Medical Cohort

Beneficiary Risk Factor	Odds Ratio	P-Value
Dual Enrollment	1.12	0.336
Claims-Based Frailty (2 or more indicators)	1.38	0.001

Note: Bolded values are statistically significant at p<0.05.

Table 8.67. Association between Dual Enrollment, Claims-Based Frailty Indicators, ADLs, IADLs, and All-Cause Hospital Readmissions for the Medical Cohort

Beneficiary Risk Factor	Odds Ratio	P-Value
Dual Enrollment	1.05	0.661
Claims-Based Frailty (2 or more indicators)	1.32	0.003
Count of ADL Difficulties		
0*		
1	0.91	0.248
2 or More	1.06	0.491
Difficulties with 1 or More IADLs	1.13	0.411

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. ADL=activities of daily living; IADL=instrumental activities of daily living.

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Table 8.68. Association between Dual Enrollment, Claims-Based Frailty Indicators, ADLs, IADLs, General Health, and All-Cause Hospital Readmissions for the Medical Cohort

Beneficiary Risk Factor	Odds Ratio	P-Value
Dual Enrollment	1.03	0.816
Claims-Based Frailty (2 or more indicators)	1.32	0.002
Count of ADL Difficulties		
0*		
1	0.91	0.248
2 or More	1.03	0.691
Difficulties with 1 or More IADLs	1.08	0.606
General Health		
Excellent/Very Good*		
Good	0.99	0.808
Fair/Poor	1.17	0.026

* indicates reference group in multi-value categorical variables.

Note: Bolded values are statistically significant at p<0.05. ADL=activities of daily living; IADL=instrumental activities of daily living.

d. Association between Functional Risk Factors, Social Risk Factors, and All-Cause Hospital Readmissions for the Medical Cohort

Table 8.69. Association between Social Risk Factors, Functional Risk Factors, and All-Cause Hospital Readmissions for the Medical Cohort

Model	Dual Enrollment Beneficiary Effect	Model C-statistic
Raw Difference	1.30	
Measure Risk Adjustment (RA) Only	1.13	0.63
RA + Claims-Based Social Risk Factors	1.08	0.64
RA + Claims-Based + MCBS Social Risk Factors	0.86	0.41
RA + Claims-Based + MCBS Social Risk Factors + SDI	0.88	0.50

Note: Bolded values are statistically significant at p<0.05. Social risk factors include: rural (living outside a metropolitan statistical area (MSA)), race/ethnicity (Black, Hispanic, white, other), marital status, education, language, Lives Alone, private health insurance, home ownership, income, and total assets. SDI=social deprivation index; MCBS=Medicare current beneficiary survey.

Chapter 15. Summary of Findings and Recommendations

I. Key Findings

This Report includes key findings for each analytic chapter, reiterated below.

A. Collecting and Using Social Risk Data

1. Many providers, health plans, and social service organizations are collecting social risk information, but not in a consistent way.
2. Various elements of social risk data are being collected by different government organizations (federal, state, and local government), but these elements are not shared across organizations.
3. Work has begun to measure and report quality for beneficiaries with social risk factors, but more is needed to improve and coordinate efforts.

B. Social and Medical Risk Factors in Medicare's Value-Based Purchasing (VBP) Programs

1. Claims-Based Functional Risk Factors

1. Medical risk, as assessed using both the current risk adjustment and functional risk factors, is associated with poor outcomes.
2. Social risk is highly correlated with functional risk factors.
3. Accounting for functional risk generally lowers the effect of dual enrollment (and in some cases eliminates it). However, dually enrolled beneficiaries still have worse outcomes, even after accounting for functional risk factors.
4. The effect of including functional risk factors varies by measure, in part due to differences in risk-adjustment models. Claims-based approaches to assessing functional risk factors are feasible and improve the explanatory power of measure risk adjustment.
5. Adjusting measures for social or functional risk factors reduces the disparity between safety-net and other providers, although these adjustments have only a small effect on VBP program payment adjustments.

8. Social and Medical Risk Factors in the Medicare Current Beneficiary Survey (MCBS)

1. Dually enrolled beneficiaries have a higher prevalence of social and medical risk factors.
2. All social and functional risk factors are independently associated with higher spending and hospital readmissions.
3. Of all available social risk factors, dual enrollment and social support are the strongest predictors of poor outcomes.
4. Of all available functional risk factors, limitations in activities of daily living (ADLs) and instrumental activities of daily living (IADLs) and claims-based functional risk factors are strong predictors of higher spending.
5. The small sample size of the MCBS makes drawing conclusions about these relationships more difficult, particularly for measures that focus on a subpopulation using specific health services.

C. Best Practices for Addressing Social Risk in the Health Care System

1. Addressing beneficiaries' social needs requires applying best practices to address social risk within the health care system and larger community.
2. Most current interventions to address social risk focus on screening for social risk, care management, and referring patients to local social service organizations to address their needs.
3. More coordination and alignment between medical and social services is needed.
4. Many challenges identified by certain plans and providers are being successfully addressed by other plans and/or providers, but successful approaches need to be better disseminated.
5. More evaluation of interventions to address social risk is needed. There is little information about which interventions are successful and even less about how much implementing the intervention costs.
6. Transportation, food insecurity, housing, and social support are the most commonly cited social risk factors that need addressing. Providers and plans are implementing numerous interventions to address transportation, food insecurity, and housing needs, but fewer addressing social support needs.

II. Recommendations

C. Strategy 3: Reward and Support Better Outcomes for Beneficiaries with Social Risk Factors

Table 15.1. Accounting for Social Risk in Medicare Programs

Setting	Payment System		VBP Program	
	Type	Accounts for Social Risk	Program	Accounts for Social Risk
Physician	Fee Schedule		MIPS	Resource Use Measure*
Ambulance	Fee Schedule			
Clinical Labs	Fee Schedule			
Durable Medical Equipment	Fee Schedule			
Hospital Inpatient	Prospective Payment	✓	HRRP HVBP HACRP	Program
Hospital Outpatient	Prospective Payment		MIPS	Resource Use Measure*
Home Health Agency	Prospective Payment		HHVBP	
Hospice	Prospective Payment			
Skilled Nursing Facility	Prospective Payment		SNF VBP	
Inpatient Psychiatric Facility	Prospective Payment			
Inpatient Rehabilitation Facility	Prospective Payment	✓		
ESRD Dialysis	Prospective Payment		ESRD QIP	
Medicare Advantage	Capitated Payment	✓	Star Ratings	Program & Outcome Measures**
PACE	Capitated Payment	✓		

*The Total per Capita Cost (TPCC) measure in the MIPS program adjusts using a risk score adjusted for dual enrollment.

**The improving or maintaining physical health and improving or maintaining mental health measures in the Star Ratings program adjust for dual enrollment, race/ethnicity, social security insurance (SSI), home ownership, and education.

Note: ESRD=End Stage Renal Disease; PACE= Programs of All-Inclusive Care for the Elderly; MIPS=Merit-based Incentive Payment System; HRRP=Hospital Readmissions Reduction Program; HVBP=Hospital Value-based Purchasing; HACRP=Hospital-Acquired Condition Reduction Program; HHVBP=Home Health Value-based Purchasing; SNF VBP=Skilled Nursing Facility Value-based Purchasing; ESRD QIP=ESRD Quality Incentive Program.