Supplementary Appendix

Thirty-day re-observation, chronic re-observation, and neighborhood disadvantage

Supplementary Appendix
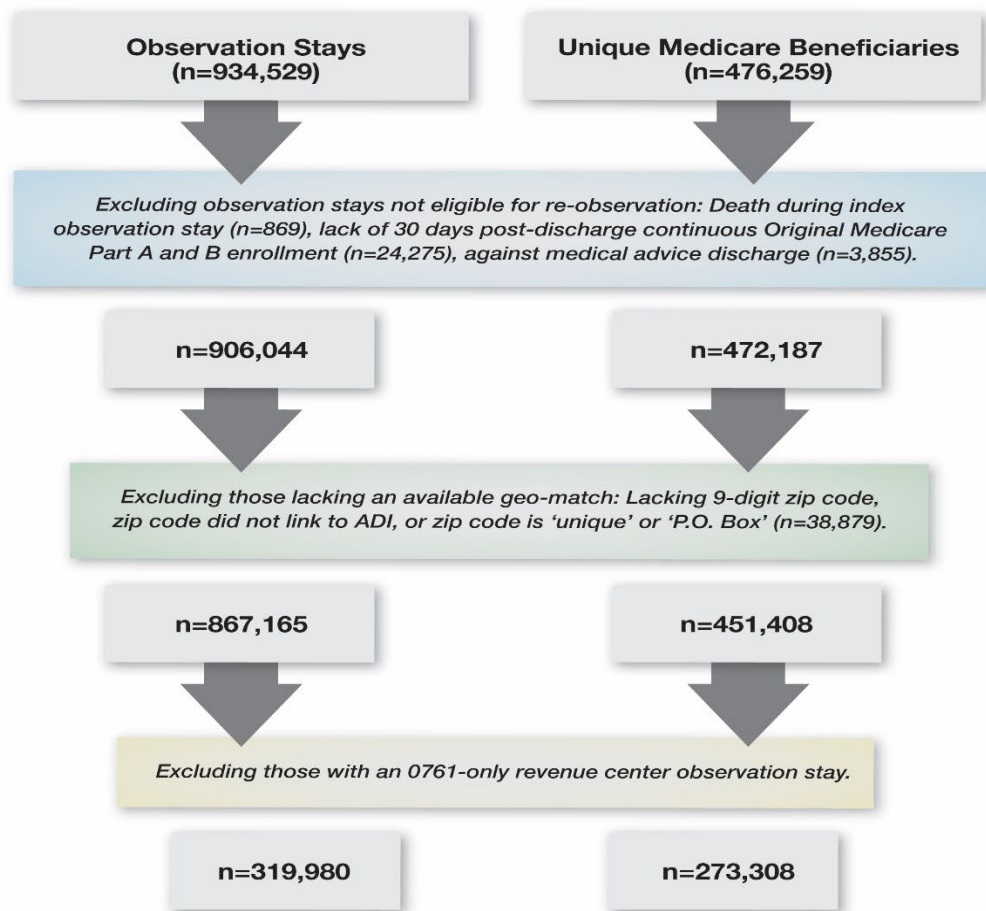
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Supplemental Figure. Sample derivation of original Medicare 20% random sample, including observation stays between January 1, 2014 and November 30, 2014.[a]

[a]Included observation stays that met the University of Wisconsin definition based on observation revenue center codes, and had standard exclusions applied, including hospitalization at exempt cancer hospitals (n=13,872) or non-acute care facilities such as rehabilitation or psychiatric hospitals (n=11,235), or beneficiaries with non-continuous Medicare enrollment for 12 months prior to index encounter (n=37,469), those with railroad benefits (n=5,637), or Medicare Advantage (n=33,570). Additionally, observation stays were excluded if they lacked daily consecutive observation revenue center codes for the stay (n=71,194) as an additional quality control measure to exclude potentially erroneous stays.

Supplemental Table 1. Level 1 Clinical Classification Software codes for re-observation diagnoses.

Level 1 Diagnoses	Most Disadvantaged 15% n (%)	Least Disadvantaged 85% n (%)
Neoplasms	49 (1.7)	507 (3.7)
Diseases of the circulatory system	1005 (35.2)	4306 (31.8)
Complications of pregnancy; childbirth; and the puerperium	56 (2)	171 (1.3)
Injury and poisoning	159 (5.6)	921 (6.8)
Infectious and parasitic diseases	24 (0.8)	63 (0.5)
Mental illness	55 (1.9)	351 (2.6)
Diseases of the nervous system and sense organs	172 (6)	957 (7.1)
Diseases of the genitourinary system	140 (4.9)	788 (5.8)
Diseases of the respiratory system	203 (7.1)	833 (6.2)
Residual codes; unclassified; all E codes [259. and 260.]	79 (2.8)	298 (2.2)
Endocrine; nutritional; and metabolic diseases and immunity disorders	175 (6.1)	735 (5.4)
Diseases of the skin and subcutaneous tissue	63 (2.2)	255 (1.9)
Symptoms; signs; and ill-defined conditions and factors influencing health status	259 (9.1)	1297 (9.6)
Diseases of the musculoskeletal system and connective tissue	150 (5.3)	758 (5.6)
Diseases of the blood and blood-forming organs	93 (3.3)	468 (3.5)
Congenital anomalies	a	a
Diseases of the digestive system	173 (6.1)	827 (6.1)

[a]Cell suppressed due to CMS data use agreement requiring cells of less than 10 to be suppressed.

Supplemental Table 2. Unadjusted and fully adjusted 30-day re-observation risk for each individual covariate.

Key Characteristic	Crude		Adjusted	
	OR	95% CI	OR	95% CI
Key exposure variable				
Most disadvantaged 15%	1.43	1.31-1.55	1.13	1.04-1.22
Patients				
18-39 y	1.00		1.00	
40-49 y	0.71	0.58-0.87	0.72	0.60-0.87
50-59 y	0.55	0.45-0.67	0.57	0.47-0.68
60-69 y	0.35	0.30-0.42	0.47	0.39-0.57
70-79 y	0.31	0.26-0.37	0.47	0.38-0.57
>=80 y	0.32	0.27-0.38	0.51	0.41-0.63
Female	0.87	0.82-0.92	0.90	0.85-0.95
Race				
White, unknown	1.00		1.00	
African American	1.45	1.33-1.59	1.07	0.99-1.15
Other race	1.04	0.95-1.15	0.89	0.81-0.98
Medicaid	1.72	1.63-1.83	1.14	1.07-1.20
Disabled	1.66	1.57-1.76	1.01	0.93-1.09
Rural-urban commuting area for patient residence				
Urban core area, unknown	1.00		1.00	
Suburban area	0.90	0.81-1.00	0.88	0.80-0.97
Large rural area	0.99	0.91-1.07	0.90	0.84-0.97

Key Characteristic	Crude		Adjusted	
	OR	95% CI	OR	95% CI
Small town/isolated rural	1.15	1.06-1.24	0.92	0.85-1.00
Hierarchical condition category score in prior year	1.21	1.20-1.23	1.07	1.05-1.10
Comorbid conditions in year prior				
Hypertension	1.64	1.55-1.74	1.18	1.11-1.27
Uncomplicated diabetes	1.44	1.36-1.53	1.01	0.95-1.08
Fluid and electrolyte disorders	1.93	1.83-2.03	1.17	1.10-1.24
Chronic pulmonary disease	1.63	1.55-1.73	1.07	1.01-1.14
Deficiency anemia	1.87	1.76-1.98	1.16	1.09-1.23
Hypothyroidism	1.13	1.07-1.20	1.00	0.94-1.06
Depression	1.91	1.80-2.03	1.22	1.15-1.28
Congestive heart failure	1.78	1.66-1.91	1.12	1.05-1.19
Renal failure	1.73	1.61-1.86	1.07	1.00-1.15
Other neurologic disorders	1.49	1.41-1.58	1.03	0.97-1.09
Peripheral vascular disease	1.55	1.44-1.68	1.13	1.04-1.22
Obesity	1.68	1.58-1.78	1.06	0.99-1.13
Valvular disease	1.38	1.26-1.50	1.07	0.98-1.16
Complicated diabetes	1.79	1.65-1.94	1.04	0.95-1.13
Solid tumor without metastasis	1.16	1.08-1.25	0.99	0.91-1.07
Psychoses	2.11	1.97-2.27	1.25	1.16-1.35
Weight loss	1.71	1.57-1.87	0.99	0.91-1.09
Coagulopathy	1.72	1.58-1.87	0.98	0.89-1.08
Rheumatoid arthritis/collagen vascular disease	1.24	1.12-1.36	0.95	0.87-1.05
Pulmonary circulation disease	1.98	1.71-2.30	1.20	1.06-1.36
Drug abuse	3.35	3.04-3.70	1.65	1.49-1.82

Key Characteristic	Crude OR	95% CI	Adjusted OR	95% CI
Liver disease	2.01	1.78-2.26	1.15	1.03-1.30
Alcohol abuse	2.18	1.90-2.50	1.12	0.99-1.26
Paralysis	1.50	1.34-1.67	0.99	0.89-1.11
Metastatic cancer	1.58	1.37-1.81	1.21	1.04-1.40
Chronic blood loss anemia	1.84	1.61-2.09	1.10	0.97-1.26
Lymphoma	1.48	1.23-1.77	1.20	1.00-1.44
AIDS	2.26	1.77-2.87	1.02	0.79-1.33
Peptic ulcer disease excluding bleeding	1.57	1.08-2.28	1.01	0.69-1.47
Length of index observation hospitalization				
1 d	1.00		1.00	
2 d	0.91	0.85-0.97	0.89	0.83-0.94
3 d	0.96	0.88-1.05	0.93	0.85-1.02
>=4 d	1.34	1.14-1.57	1.29	1.09-1.52
Observation stay originated from ED visit	0.65	0.61-0.70	0.62	0.58-0.66
Discharged to skilled-nursing facility	0.77	0.70-0.85	0.63	0.57-0.69
Index hospital				
Medical school affiliation				
Major medical school	1.09	1.01-1.18	1.03	0.96-1.10
Minor medical school	1.08	1.02-1.14	1.09	1.03-1.16
No medical school, unknown	1.00		1.00	
Hospital type				
Nonprofit, public hospital	1.00		1.00	
For-profit hospital	0.92	0.84-1.00	0.90	0.83-0.98

Key Characteristic	Crude OR	95% CI	Adjusted OR	95% CI
Mean annual total discharge volume				
Highest tertile	1.00		1.00	
Middle tertile	1.08	1.01-1.15	1.17	1.10-1.25
Lowest tertile	1.59	1.41-1.78	1.81	1.60-2.04