

Supplemental Online Content

Goodwin JS, Li S, Hommel E, Nattinger AB, Kuo YF, Raji M. Association of inpatient continuity of care with complications and length of stay among hospitalized Medicare enrollees. *JAMA Netw Open*. 2021;4(8):e2120622.
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eFigure. Cohort Selection

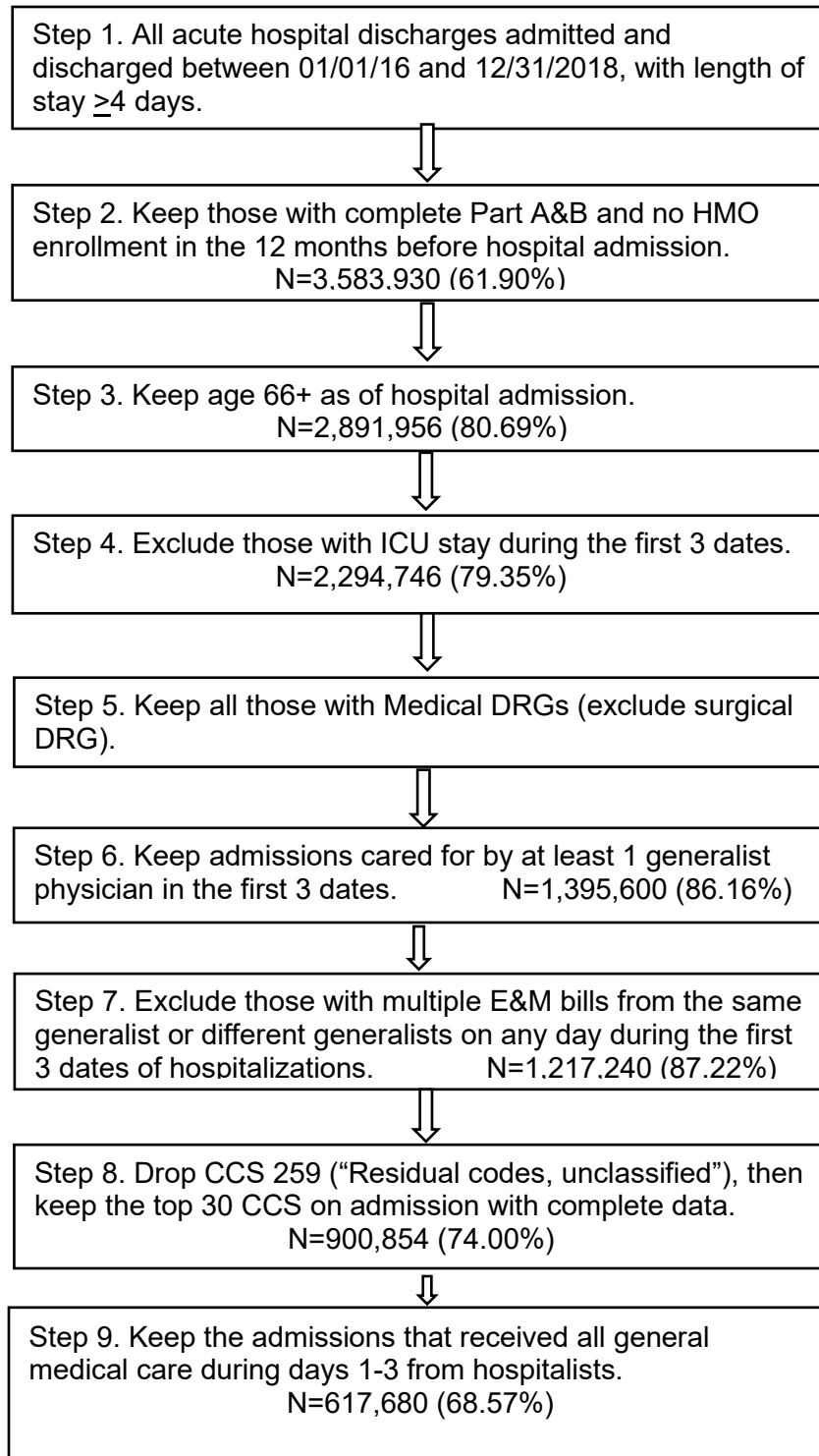
eTable 1. Odds of Adverse Effects of Medical Drugs

eTable 2. Odds of ICU Transfer for Admissions

eTable 3. Length of Stay for Admissions

This supplemental material has been provided by the authors to give readers additional information about their work.

eFigure. Cohort selection.



Abbreviations: ICU: intensive care unit; HMO, health maintenance organization; DRG, Diagnosis-related group; CCS, Clinical Classification Software; E&M, evaluation and management.

Supplement Table e1. Odds of adverse effects of medical drugs^a

Characteristic	N (%)	Observed rate	Odds Ratio* (95% Confidence Interval)
All	617,680	7.3%	
# of hospitalists			
1	306,037 (49.6%)	7.0%	Reference
2	274,658 (44.5%)	7.6%	1.03 (1.01-1.05)
3	36,985 (6.0%)	7.9%	1.05 (1.01-1.10)
Age (Per year)			
Q1 (>=66; <=73)	160,586 (26.0%)	8.0%	Reference
Q2 (>=74; <=80)	158,226 (25.6%)	7.8%	0.95 (0.92-0.97)
Q3 (>=81; <=87)	160,506 (26.0%)	7.2%	0.85 (0.83-0.88)
Q4 (>87)	138,362 (22.4%)	6.1%	0.71 (0.69-0.74)
Education (Percent of persons age 25+ in Zip area with high school education) (Per percent)			
Q1 (<=83.0)	155,592 (25.2%)	6.8%	Reference
Q2 (>=83.1; <=89.0)	157,402 (25.5%)	7.2%	1.02 (0.99-1.05)
Q3 (>=89.1; <=93.1)	151,328 (24.5%)	7.5%	1.01 (0.98-1.05)
Q4 (>=93.2)	153,358 (24.8%)	7.9%	1.03 (0.99-1.07)
Year			
2016	195,558 (31.7%)	7.3%	Reference
2017	210,232 (34.0%)	7.4%	1.02 (0.99-1.04)
2018	211,890 (34.3%)	7.3%	1.01 (0.99-1.03)
Gender			
Male	255,304 (41.3%)	7.1%	Reference
Female	362,376 (58.7%)	7.5%	1.13 (1.11-1.15)
Medicaid			
No	484,979 (78.5%)	7.6%	Reference
Yes	132,701 (21.5%)	6.4%	0.92 (0.89-0.94)
Race			
White	516,940 (83.7%)	7.5%	Reference
Black	54,234 (8.8%)	6.2%	0.83 (0.80-0.87)
Hispanic	26,701 (4.3%)	6.5%	0.94 (0.89-0.99)
Other	19,805 (3.2%)	7.5%	1.01 (0.95-1.07)
Residence prior to hospitalization			
Community	562,986 (91.2%)	7.4%	Reference
Nursing facility or other institutions	54,694 (8.9%)	6.8%	1.01 (0.97-1.05)
Emergency hospitalization			
No	106,922 (17.3%)	7.1%	Reference
Yes	510,758 (82.7%)	7.4%	1.03 (0.99-1.06)
Weekend hospitalization			
No	438,932 (71.1%)	7.3%	Reference
Yes	178,748 (28.9%)	7.3%	1.00 (0.98-1.02)

Characteristic	N (%)	Observed rate	Odds Ratio* (95% Confidence Interval)
CCS on admission			
102 Nonspecific chest pain	17,141 (2.8%)	6.0%	Reference
106 Cardiac dysrhythmias	16,672 (2.7%)	8.0%	1.28 (1.17-1.39)
108 Congestive heart failure; nonhypertensive	29,343 (4.8%)	6.7%	1.15 (1.06-1.24)
109 Acute cerebrovascular disease	14,757 (2.4%)	3.5%	0.54 (0.49-0.61)
122 Pneumonia	43,118 (7.0%)	6.1%	1.04 (0.96-1.12)
127 Chronic obstructive pulmonary disease and bronchiectasis	23,103 (3.7%)	9.5%	1.59 (1.47-1.72)
131 Respiratory failure; insufficiency	11,916 (1.9%)	8.6%	1.43 (1.30-1.57)
133 Other lower respiratory disease	88,615 (14.5%)	7.6%	1.27 (1.18-1.36)
145 Intestinal obstruction without hernia	8,821 (1.4%)	4.7%	0.71 (0.63-0.80)
153 Gastrointestinal hemorrhage	24,940 (4.0%)	8.8%	1.52 (1.41-1.64)
155 Other gastrointestinal disorders	11,586 (1.9%)	8.7%	1.45 (1.32-1.59)
157 Acute and unspecified renal failure	20,443 (3.3%)	11.2%	2.03 (1.88-2.20)
159 Urinary tract infections	32,008 (5.2%)	4.2%	0.73 (0.67-0.80)
163 Genitourinary symptoms and ill-defined conditions	5,556 (0.9%)	9.4%	1.68 (1.51-1.88)
197 Skin and subcutaneous tissue infections	19,716 (3.2%)	5.5%	0.89 (0.81-0.97)
2 Other skin disorders	38,449 (6.2%)	5.3%	0.87 (0.81-0.94)
204 Other non-traumatic joint disorders	8,260 (1.3%)	6.8%	1.12 (1.02-1.24)
205 Spondylosis; intervertebral disc disorders; other back problems	9,428 (1.5%)	9.6%	1.55 (1.41-1.71)
211 Other connective tissue disease	13,292 (2.2%)	6.8%	1.12 (1.02-1.23)
Characteristic	N (%)	Observed rate	Odds Ratio* (95% Confidence Interval)
231 Other fractures	10,181 (1.7%)	6.6%	1.10 (0.99-1.22)

245 Syncope	16,212 (2.6%)	8.6%	1.50 (1.38-1.64)
246 Fever of unknown origin	16,008 (2.6%)	6.8%	1.10 (1.01-1.20)
250 Nausea and vomiting	10,747 (1.7%)	8.7%	1.45 (1.32-1.59)
251 Abdominal pain	25,465 (4.1%)	6.3%	1.00 (0.92-1.08)
252 Malaise and fatigue	39,663 (6.4%)	7.7%	1.32 (1.23-1.42)
55 Fluid and electrolyte disorders	21,442 (3.5%)	10.8%	1.97 (1.83-2.13)
59 Deficiency and other anemia	7,376 (1.2%)	7.9%	1.39 (1.24-1.54)
93 Conditions associated with dizziness or vertigo	6,343 (1.0%)	8.8%	1.44 (1.29-1.61)
95 Other nervous system disorders	14,815 (2.4%)	10.1%	1.76 (1.62-1.92)
99 Hypertension with complications and secondary hypertension	12,264 (2.0%)	6.6%	1.15 (1.04-1.26)
Elixhauser comorbidity			
Alcohol abuse			
No	601,762 (97.4%)	7.3%	Reference
Yes	15,918 (2.6%)	6.5%	0.93 (0.87-0.99)
Cardiac Arrhythmia			
No	331,189 (53.6%)	7.3%	Reference
Yes	286,491 (46.4%)	7.3%	1.11 (1.08-1.13)
Blood Loss Anemia			
No	591,125 (95.7%)	7.4%	Reference
Yes	26,555 (4.3%)	5.8%	0.83 (0.78-0.87)
Congestive Heart Failure			
No	379,969 (61.5%)	7.6%	Reference
Yes	237,711 (38.5%)	6.8%	0.98 (0.96-1.01)
Chronic Pulmonary Disease			
No	376,634 (61.0%)	7.3%	Reference
Yes	241,046 (39.0%)	7.4%	1.06 (1.03-1.08)
Coagulopathy			
No	553,501 (89.6%)	7.4%	Reference
Yes	64,179 (10.4%)	6.8%	0.96 (0.93-0.99)
Deficiency Anemia			
No	510,324 (82.6%)	7.5%	Reference
Yes	107,358 (17.4%)	6.3%	0.89 (0.87-0.92)
Depression			
No	459,295 (74.4%)	7.6%	Reference
Characteristic	N (%)	Observed rate	Odds Ratio* (95% Confidence Interval)
Yes	158,385 (25.6%)	6.5%	0.91 (0.88-0.93)
Diabetes Complicated			
No	441,206 (71.4%)	7.5%	Reference

Yes	176,474 (28.6%)	6.9%	0.96 (0.93-0.99)
Diabetes Uncomplicated			
No	389,910 (63.1%)	7.5%	Reference
Yes	227,770 (36.9%)	7.1%	1.01 (0.98-1.04)
Drug Abuse			
No	602,863 (97.6%)	7.3%	Reference
Yes	14,817 (2.4%)	7.0%	1.02 (0.96-1.09)
Fluid and Electrolyte Disorders			
No	370,102 (59.9%)	7.8%	Reference
Yes	247,578 (40.1%)	6.6%	0.87 (0.85-0.89)
AIDS/HIV			
No	616,801 (99.9%)	7.3%	Reference
Yes	879 (0.1%)	7.4%	1.13 (0.88-1.47)
Hypertension complicated			
No	389,947 (63.1%)	7.7%	Reference
Yes	227,733 (36.9%)	6.7%	0.92 (0.90-0.95)
Hypertension Uncomplicated			
No	104,392 (16.9%)	7.3%	Reference
Yes	513,288 (83.1%)	7.3%	1.11 (1.08-1.14)
Hypothyroidism			
No	450,545 (72.9%)	7.3%	Reference
Yes	167,135 (27.1%)	7.2%	1.02 (0.99-1.04)
Liver Disease			
No	583,796 (94.5%)	7.3%	Reference
Yes	33,884 (5.5%)	7.0%	0.95 (0.91-0.99)
Lymphoma			
No	603,924 (97.8%)	7.2%	Reference
Yes	13,756 (2.2%)	10.6%	1.47 (1.39-1.56)
Metastatic Cancer			
No	590,033 (95.5%)	7.1%	Reference
Yes	27,647 (4.5%)	11.8%	1.55 (1.48-1.63)
Obesity			
No	514,524 (83.3%)	7.3%	Reference
Yes	103,156 (16.7%)	7.4%	1.01 (0.98-1.04)
Other Neurological Disorders			
No	501,296 (81.2%)	7.7%	Reference
Yes	116,384 (18.8%)	5.7%	0.83 (0.80-0.85)
Pulmonary Circulation Disorders			
No	539,536 (87.4%)	7.3%	Reference
Characteristic	N (%)	Observed rate	Odds Ratio* (95% Confidence Interval)
Yes	78,144 (12.6%)	7.2%	1.01 (0.97-1.04)
Peptic Ulcer Disease excluding bleeding			

No	604,641 (97.9%)	7.3%	Reference
Yes	13,039 (2.1%)	6.1%	0.93 (0.86-1.00)
Peripheral Vascular Disorders			
No	434,811 (70.4%)	7.6%	Reference
Yes	182,869 (29.6%)	6.6%	0.93 (0.91-0.96)
Paralysis			
No	598,131 (96.8%)	7.4%	Reference
Yes	19,549 (3.2%)	5.4%	0.87 (0.81-0.93)
Psychoses			
No	600,389 (97.2%)	7.4%	Reference
Yes	17,291 (2.8%)	5.2%	0.85 (0.79-0.91)
Renal Failure			
No	401,389 (64.9%)	7.6%	Reference
Yes	216,291 (35.1%)	6.8%	1.03 (0.99-1.06)
Weight Loss			
No	542,299 (87.8%)	7.6%	Reference
Yes	75,381 (12.2%)	5.6%	0.76 (0.74-0.79)
Valvular Disease			
No	485,214 (78.6%)	7.4%	Reference
Yes	132,466 (21.4%)	7.2%	1.02 (0.99-1.05)
Solid Tumor without Metastasis			
No	524,918 (85.0%)	7.0%	Reference
Yes	92,762 (15.0%)	8.9%	1.12 (1.09-1.16)
Rheumatoid Arthritis/collagen			
No	569,670 (92.2%)	7.3%	Reference
Yes	48,010 (7.8%)	7.8%	1.08 (1.04-1.11)
Hospital Characteristic			
Bed Size			
>500	158.306 (25.6%)	7.4%	Reference
350<, <=500	100.925 (16.3%)	7.8%	1.04 (0.97-1.12)
200<, <=350	172.408 (27.9%)	7.6%	1.05 (0.98-1.14)
<=200	186.041 (30.1%)	6.7%	0.93 (0.87-1.01)
Urban Rural indicator			
Rural	93.573 (15.2%)	6.0%	Reference
Urban	524.107 (84.8%)	7.5%	1.33 (1.26-1.41)
Type of provider			
Nonprofit	460.368 (74.6%)	7.5%	Reference
For profit	81.732 (13.2%)	6.5%	0.89 (0.84-0.94)
Government	75.580 (12.2%)	6.8%	0.86 (0.81-0.91)
Characteristic	N (%)	Observed rate	Odds Ratio* (95% Confidence Interval)
Major	121.922 (19.7%)	7.6%	Reference
Limited	130.339 (21.1%)	7.5%	1.01 (0.94-1.09)
Graduate	29.110 (4.7%)	7.7%	1.00 (0.89-1.11)
No affiliation	336,309 (54.5%)	7.1%	0.96 (0.90-1.03)

SD, standard deviation; CCS, Clinical Classification Software; AIDS, acquired immune deficiency syndrome; HIV, human immunodeficiency virus.

^a Odds of adverse effect of medical drugs for admissions on day 4 or later as a function of the number of hospitalists providing care during the first 3 days of hospitalization, adjusted for patient characteristics and hospital characteristics, from a **two level multivariable** (01/01/2016-12/31/2018, 20% National Medicare data).

Supplement Table e2. Odds of ICU Transfer for Admissions^a

Characteristic	N (%)	Observed rate	Odds Ratio* (95% Confidence Interval)
All	617,680	1.9%	
# of generalists			
1	306,037 (49.6%)	1.9%	Reference
2	274,658 (44.5%)	1.9%	1.02 (0.98-1.06)
3	36,985 (6.0%)	2.0%	1.03 (0.95-1.12)
Age (Per year)			
Q1 (>=66; <=73)	160,586 (26.0%)	2.2%	Reference
Q2 (>=74; <=80)	158,226 (25.6%)	2.2%	0.97 (0.92-1.02)
Q3 (>=81; <=87)	160,506 (26.0%)	1.8%	0.82 (0.77-0.86)
Q4 (>87)	138,362 (22.4%)	1.4%	0.66 (0.62-0.70)
Education (Percent of persons age 25+ in Zip area with high school education) (Per percent)			
Q1 (<=83.0)	155,592 (25.2%)	2.0%	Reference
Q2 (>=83.1; <=89.0)	157,402 (25.5%)	1.9%	0.98 (0.93-1.04)
Q3 (>=89.1; <=93.1)	151,328 (24.5%)	1.9%	0.96 (0.91-1.02)
Q4 (>=93.2)	153,358 (24.8%)	1.9%	0.97 (0.91-1.02)
Year			
2016	195,558 (31.7%)	1.9%	Reference
2017	210,232 (34.0%)	1.9%	1.01 (0.96-1.06)
2018	211,890 (34.3%)	1.9%	0.98 (0.93-1.02)
Gender			
Male	255,304 (41.3%)	2.2%	Reference
Female	362,376 (58.7%)	1.7%	0.84 (0.81-0.88)
Medicaid			
No	484,979 (78.5%)	1.9%	Reference
Yes	132,701 (21.5%)	2.0%	0.98 (0.93-1.03)
Race			
White	516,940 (83.7%)	1.9%	Reference
Black	54,234 (8.8%)	2.2%	1.08 (1.01-1.15)
Hispanic	26,701 (4.3%)	2.2%	1.12 (1.02-1.23)
Other	19,805 (3.2%)	2.2%	1.08 (0.98-1.17)
Residence prior to hospitalization			
Community	562,986 (91.2%)	1.9%	Reference
Nursing facility or other institutions	54,694 (8.9%)	2.3%	1.27 (1.19-1.36)
Emergency hospitalization			
No	106,922 (17.3%)	1.7%	Reference
Yes	510,758 (82.7%)	1.9%	1.13 (1.07-1.19)
Weekend hospitalization			
No	438,932 (71.1%)	1.9%	Reference
Yes	178,748 (28.9%)	1.8%	0.96 (0.92-0.99)

Characteristic	N (%)	Observed rate	Odds Ratio* (95% Confidence Interval)
CCS on admission			
102 Nonspecific chest pain	17,141 (2.8%)	1.6%	Reference
106 Cardiac dysrhythmias	16,672 (2.7%)	1.9%	1.34 (1.14-1.58)
108 Congestive heart failure; nonhypertensive	29,343 (4.8%)	2.1%	1.33 (1.15-1.54)
109 Acute cerebrovascular disease	14,757 (2.4%)	1.7%	1.31 (1.10-1.56)
122 Pneumonia	43,118 (7.0%)	2.3%	1.68 (1.47-1.93)
127 Chronic obstructive pulmonary disease and bronchiectasis	23,103 (3.7%)	1.7%	1.11 (0.95-1.30)
131 Respiratory failure; insufficiency	11,916 (1.9%)	4.1%	2.77 (2.37-3.22)
133 Other lower respiratory disease	88,615 (14.5%)	2.4%	1.52 (1.34-1.73)
145 Intestinal obstruction without hernia	8,821 (1.4%)	1.5%	1.08 (0.88-1.34)
153 Gastrointestinal hemorrhage	24,940 (4.0%)	1.6%	1.04 (0.89-1.21)
155 Other gastrointestinal disorders	11,586 (1.9%)	2.1%	1.44 (1.21-1.72)
157 Acute and unspecified renal failure	20,443 (3.3%)	2.0%	1.32 (1.13-1.55)
159 Urinary tract infections	32,008 (5.2%)	1.0%	0.72 (0.61-0.85)
163 Genitourinary symptoms and ill-defined conditions	5,556 (0.9%)	1.2%	0.80 (0.61-1.05)
197 Skin and subcutaneous tissue infections	19,716 (3.2%)	0.9%	0.59 (0.48-0.71)
2 Other skin disorders	38,449 (6.2%)	2.9%	2.06 (1.80-2.36)
204 Other non-traumatic joint disorders	8,260 (1.3%)	1.1%	0.86 (0.67-1.09)
205 Spondylosis; intervertebral disc disorders; other back problems	9,428 (1.5%)	1.4%	1.02 (0.82-1.26)
211 Other connective tissue disease	13,292 (2.2%)	1.1%	0.81 (0.66-0.98)
Characteristic	N (%)	Observed rate	Odds Ratio* (95% Confidence Interval)
231 Other fractures	10,181 (1.7%)	1.2%	0.96 (0.77-1.20)

245 Syncope	16,212 (2.6%)	1.3%	0.92 (0.77-1.11)
246 Fever of unknown origin	16,008 (2.6%)	1.9%	1.27 (1.08-1.50)
250 Nausea and vomiting	10,747 (1.7%)	1.8%	1.28 (1.06-1.54)
251 Abdominal pain	25,465 (4.1%)	1.7%	1.15 (0.98-1.33)
252 Malaise and fatigue	39,663 (6.4%)	1.7%	1.21 (1.05-1.40)
55 Fluid and electrolyte disorders	21,442 (3.5%)	1.9%	1.31 (1.12-1.53)
59 Deficiency and other anemia	7,376 (1.2%)	1.6%	1.00 (0.81-1.25)
93 Conditions associated with dizziness or vertigo	6,343 (1.0%)	1.1%	0.76 (0.58-0.99)
95 Other nervous system disorders	14,815 (2.4%)	1.7%	1.17 (0.98-1.40)
99 Hypertension with complications and secondary hypertension	12,264 (2.0%)	2.2%	1.35 (1.13-1.60)
Elixhauser comorbidity			
Alcohol abuse			
No	601,762 (97.4%)	1.9%	Reference
Yes	15,918 (2.6%)	2.6%	1.07 (0.97-1.19)
Cardiac Arrhythmia			
No	331,189 (53.6%)	1.7%	Reference
Yes	286,491 (46.4%)	2.2%	1.11 (1.06-1.16)
Blood Loss Anemia			
No	591,125 (95.7%)	1.9%	Reference
Yes	26,555 (4.3%)	2.4%	1.03 (0.94-1.12)
Congestive Heart Failure			
No	379,969 (61.5%)	1.6%	Reference
Yes	237,711 (38.5%)	2.3%	1.17 (1.11-1.23)
Chronic Pulmonary Disease			
No	376,634 (61.0%)	1.7%	Reference
Yes	241,046 (39.0%)	2.3%	1.10 (1.06-1.15)
Coagulopathy			
No	553,501 (89.6%)	1.8%	Reference
Yes	64,179 (10.4%)	2.6%	1.13 (1.06-1.19)
Deficiency Anemia			
No	510,324 (82.6%)	1.8%	Reference
Yes	107,358 (17.4%)	2.3%	1.03 (0.98-1.08)
Depression			
No	459,295 (74.4%)	1.9%	Reference
Characteristic	N (%)	Observed rate	Odds Ratio* (95% Confidence Interval)
Yes	158,385 (25.6%)	1.9%	0.88 (0.84-0.92)
Diabetes Complicated			
No	441,206 (71.4%)	1.8%	Reference

Yes	176,474 (28.6%)	2.2%	1.03 (0.97-1.09)
Diabetes Uncomplicated			
No	389,910 (63.1%)	1.8%	Reference
Yes	227,770 (36.9%)	2.1%	0.98 (0.93-1.03)
Drug Abuse			
No	602,863 (97.6%)	1.9%	Reference
Yes	14,817 (2.4%)	2.1%	0.90 (0.80-1.02)
Fluid and Electrolyte Disorders			
No	370,102 (59.9%)	1.7%	Reference
Yes	247,578 (40.1%)	2.2%	1.08 (1.03-1.13)
AIDS/HIV			
No	616,801 (99.9%)	1.9%	Reference
Yes	879 (0.1%)	2.4%	0.89 (0.57-1.38)
Hypertension complicated			
No	389,947 (63.1%)	1.7%	Reference
Yes	227,733 (36.9%)	2.3%	1.01 (0.95-1.06)
Hypertension Uncomplicated			
No	104,392 (16.9%)	1.8%	Reference
Yes	513,288 (83.1%)	1.9%	0.89 (0.85-0.94)
Hypothyroidism			
No	450,545 (72.9%)	1.9%	Reference
Yes	167,135 (27.1%)	1.9%	0.98 (0.94-1.03)
Liver Disease			
No	583,796 (94.5%)	1.9%	Reference
Yes	33,884 (5.5%)	2.6%	1.10 (1.02-1.19)
Lymphoma			
No	603,924 (97.8%)	1.9%	Reference
Yes	13,756 (2.2%)	2.5%	1.12 (1.01-1.25)
Metastatic Cancer			
No	590,033 (95.5%)	1.9%	Reference
Yes	27,647 (4.5%)	2.7%	1.23 (1.12-1.34)
Obesity			
No	514,524 (83.3%)	1.8%	Reference
Yes	103,156 (16.7%)	2.2%	0.98 (0.93-1.03)
Other Neurological Disorders			
No	501,296 (81.2%)	1.9%	Reference
Yes	116,384 (18.8%)	2.1%	1.00 (0.94-1.04)
Pulmonary Circulation Disorders			
No	539,536 (87.4%)	1.8%	Reference
Characteristic	N (%)	Observed rate	Odds Ratio* (95% Confidence Interval)
Yes	78,144 (12.6%)	2.7%	1.18 (1.12-1.24)
Peptic Ulcer Disease excluding bleeding			

No	604,641 (97.9%)	1.9%	Reference
Yes	13,039 (2.1%)	2.2%	0.96 (0.85-1.09)
Peripheral Vascular Disorders			
No	434,811 (70.4%)	1.8%	Reference
Yes	182,869 (29.6%)	2.1%	1.02 (0.98-1.06)
Paralysis			
No	598,131 (96.8%)	1.9%	Reference
Yes	19,549 (3.2%)	2.3%	1.08 (0.98-1.20)
Psychoses			
No	600,389 (97.2%)	1.9%	Reference
Yes	17,291 (2.8%)	1.9%	0.94 (0.84-1.06)
Renal Failure			
No	401,389 (64.9%)	1.7%	Reference
Yes	216,291 (35.1%)	2.2%	1.08 (1.02-1.13)
Weight Loss			
No	542,299 (87.8%)	1.8%	Reference
Yes	75,381 (12.2%)	2.5%	1.16 (1.10-1.23)
Valvular Disease			
No	485,214 (78.6%)	1.8%	Reference
Yes	132,466 (21.4%)	2.3%	1.07 (1.02-1.12)
Solid Tumor without Metastasis			
No	524,918 (85.0%)	1.8%	Reference
Yes	92,762 (15.0%)	2.3%	1.05 (0.99-1.11)
Rheumatoid Arthritis/collagen			
No	569,670 (92.2%)	1.9%	Reference
Yes	48,010 (7.8%)	2.1%	1.09 (1.02-1.17)
Hospital Characteristic			
Bed Size			
>500	158.306 (25.6%)	2.1%	Reference
350<, <=500	100.925 (16.3%)	1.9%	0.95 (0.87-1.04)
200<, <=350	172.408 (27.9%)	2.0%	1.00 (0.92-1.08)
<=200	186.041 (30.1%)	1.7%	0.86 (0.78-0.93)
Urban Rural indicator			
Rural	93.573 (15.2%)	1.5%	Reference
Urban	524.107 (84.8%)	2.0%	1.25 (1.16-1.36)
Type of provider			
Nonprofit	460.368 (74.6%)	1.9%	Reference
For profit	81.732 (13.2%)	2.0%	1.11 (1.03-1.19)
Government	75.580 (12.2%)	1.8%	0.96 (0.89-1.05)
Characteristic			
	N (%)	Observed rate	Odds Ratio* (95% Confidence Interval)
Major	121.922 (19.7%)	2.1%	Reference
Limited	130.339 (21.1%)	2.0%	0.97 (0.89-1.06)
Graduate	29.110 (4.7%)	1.8%	0.87 (0.76-0.99)
No affiliation	336,309 (54.5%)	1.8%	0.93 (0.85-1.01)

ICU, intensive care unit; CCS, Clinical Classification Software; AIDS, acquired immune deficiency syndrome; HIV, human immunodeficiency virus.

^aOdds of ICU transfer for admissions on day 4 or later as a function of the number of hospitalists providing care during the first 3 days of hospitalization, adjusted for patient characteristics and hospital characteristics, from a **two level multivariable** for 01/01/2016- 12/31/2018, 20% National Medicare data.

Supplement Table e3. Length of Stay for Admissions^a

Characteristic	N (%)	Unadjusted LOS Mean (SD)	Adjusted LOS (95% Confidence Interval)
All	617,680	5.30 (3.69)	
# of generalists			
1	306,037 (49.6%)	5.25 (3.58)	5.18 (5.16-5.21)
2	274,658 (44.5%)	5.35 (3.71)	5.19 (5.17-5.22)
3	36,985 (6.0%)	5.40 (4.43)	5.18 (5.15-5.22)
Age (Per year)			
Q1 (>=66; <=73)	160,586 (26.0%)	5.44 (3.98)	5.21 (5.18-5.24)
Q2 (>=74; <=80)	158,226 (25.6%)	5.38 (3.89)	5.21 (5.18-5.24)
Q3 (>=81; <=87)	160,506 (26.0%)	5.27 (3.62)	5.18 (5.15-5.21)
Q4 (>87)	138,362 (22.4%)	5.09 (3.15)	5.15 (5.12-5.18)
Education (Percent of persons age 25+ in Zip area with high school education) (Per percent)			
Q1 (<=83.0)	155,592 (25.2%)	5.40 (3.80)	5.22 (5.19-5.25)
Q2 (>=83.1; <=89.0)	157,402 (25.5%)	5.30 (3.77)	5.23 (5.20-5.26)
Q3 (>=89.1; <=93.1)	151,328 (24.5%)	5.26 (3.72)	5.20 (5.17-5.22)
Q4 (>=93.2)	153,358 (24.8%)	5.25 (3.47)	5.09 (5.06-5.12)
Year			
2016	195,558 (31.7%)	5.26 (3.47)	5.18 (5.16-5.21)
2017	210,232 (34.0%)	5.31 (3.68)	5.19 (5.16-5.21)
2018	211,890 (34.3%)	5.33 (3.90)	5.19 (5.16-5.22)
Gender			
Male	255,304 (41.3%)	5.41 (3.99)	5.24 (5.21-5.27)
Female	362,376 (58.7%)	5.23 (3.46)	5.15 (5.12-5.17)
Medicaid			
No	484,979 (78.5%)	5.24 (3.48)	5.16 (5.13-5.18)
Yes	132,701 (21.5%)	5.53 (4.37)	5.30 (5.27-5.33)
Race			
White	516,940 (83.7%)	5.24 (3.59)	5.18 (5.15-5.21)

Black	54,234 (8.8%)	5.76 (4.30)	5.16 (5.11-5.20)
Hispanic	26,701 (4.3%)	5.44 (4.04)	5.29 (5.26-5.33)
Other	19,805 (3.2%)	5.48 (4.02)	5.11 (5.07-5.15)
Residence prior to hospitalization			
Community	562,986 (91.2%)	5.25 (3.56)	5.15 (5.13-5.18)
Nursing facility or other institutions	54,694 (8.9%)	5.86 (4.81)	5.55 (5.52-5.59)
Emergency hospitalization			
No	106,922 (17.3%)	5.26 (3.85)	5.23 (5.20-5.26)
Yes	510,758 (82.7%)	5.31 (3.66)	5.18 (5.15-5.20)
Weekend hospitalization			
No	438,932 (71.1%)	5.34 (3.72)	5.22 (5.20-5.25)
Yes	178,748 (28.9%)	5.21 (3.62)	5.10 (5.08-5.13)
Clinical Classification Software (CCS) code on admission			
102 Nonspecific chest pain	17,141 (2.8%)	4.92 (3.56)	4.74 (4.69-4.78)
Characteristic	N (%)	Unadjusted LOS Mean (SD)	Adjusted LOS (95% Confidence Interval)
106 Cardiac dysrhythmias	16,672 (2.7%)	4.97 (3.11)	4.93 (4.89-4.97)
108 Congestive heart failure; nonhypertensive	29,343 (4.8%)	5.57 (3.74)	5.38 (5.34-5.42)
109 Acute cerebrovascular disease	14,757 (2.4%)	4.93 (3.44)	4.91 (4.87-4.96)
122 Pneumonia	43,118 (7.0%)	5.40 (3.37)	5.42 (5.39-5.46)
127 Chronic obstructive pulmonary disease and bronchiectasis	23,103 (3.7%)	5.08 (2.91)	5.10 (5.06-5.14)
131 Respiratory failure; insufficiency	11,916 (1.9%)	5.87 (4.40)	5.72 (5.66-5.77)
133 Other lower	88,615 (14.5%)	5.47 (3.51)	5.32 (5.29-5.35)

respiratory disease			
145 Intestinal obstruction without hernia	8,821 (1.4%)	5.26 (3.29)	5.25 (5.20-5.31)
153 Gastrointestinal hemorrhage	24,940 (4.0%)	4.88 (3.16)	4.72 (4.68-4.75)
155 Other gastrointestinal disorders	11,586 (1.9%)	5.77 (4.21)	5.56 (5.51-5.61)
157 Acute and unspecified renal failure	20,443 (3.3%)	5.72 (4.38)	5.52 (5.47-5.56)
159 Urinary tract infections	32,008 (5.2%)	4.97 (3.50)	4.91 (4.88-4.95)
163 Genitourinary symptoms and ill-defined conditions	5,556 (0.9%)	5.28 (4.08)	5.09 (5.03-5.16)
197 Skin and subcutaneous tissue infections	19,716 (3.2%)	5.14 (3.36)	5.12 (5.08-5.16)
2 Other skin disorders	38,449 (6.2%)	5.98 (4.68)	5.83 (5.79-5.87)
204 Other non-traumatic joint disorders	8,260 (1.3%)	4.60 (2.98)	4.61 (4.56-4.66)
205 Spondylosis; intervertebral disc disorders; other back problems	9,428 (1.5%)	5.13 (3.53)	5.10 (5.04-5.15)
211 Other connective tissue disease	13,292 (2.2%)	5.13 (4.57)	5.05 (5.00-5.09)
231 Other fractures	10,181 (1.7%)	4.53 (2.98)	4.62 (4.57-4.67)
245 Syncope	16,212 (2.6%)	4.73 (3.04)	4.63 (4.59-4.67)
246 Fever of unknown origin	16,008 (2.6%)	5.48 (3.59)	5.29 (5.25-5.34)
Characteristic	N (%)	Unadjusted LOS Mean (SD)	Adjusted LOS (95% Confidence Interval)
250 Nausea and vomiting	10,747 (1.7%)	5.31 (3.59)	5.21 (5.16-5.27)
251 Abdominal pain	25,465 (4.1%)	5.29 (3.44)	5.20 (5.16-5.24)
252 Malaise and fatigue	39,663 (6.4%)	5.23 (3.85)	5.14 (5.10-5.17)

55 Fluid and electrolyte disorders	21,442 (3.5%)	5.39 (3.90)	5.22 (5.17-5.26)
59 Deficiency and other anemia	7,376 (1.2%)	5.40 (3.83)	5.11 (5.05-5.17)
93 Conditions associated with dizziness or vertigo	6,343 (1.0%)	4.54 (3.20)	4.51 (4.46-4.57)
95 Other nervous system disorders	14,815 (2.4%)	5.39 (4.38)	5.22 (5.17-5.26)
99 Hypertension with complications and secondary hypertension	12,264 (2.0%)	5.56 (3.61)	5.31 (5.26-5.37)
Elixhauser comorbidity			
Alcohol abuse			
No	601,762 (97.4%)	5.29 (3.66)	5.18 (5.16-5.21)
Yes	15,918 (2.6%)	5.76 (4.74)	5.28 (5.23-5.32)
Cardiac Arrhythmia			
No	331,189 (53.6%)	5.14 (3.49)	5.14 (5.12-5.17)
Yes	286,491 (46.4%)	5.49 (3.91)	5.24 (5.21-5.26)
Blood Loss Anemia			
No	591,125 (95.7%)	5.28 (3.67)	5.19 (5.16-5.21)
Yes	26,555 (4.3%)	5.72 (4.12)	5.22 (5.18-5.26)
Congestive Heart Failure			
No	379,969 (61.5%)	5.13 (3.62)	5.14 (5.12-5.17)
Yes	237,711 (38.5%)	5.58 (3.80)	5.26 (5.23-5.29)
Chronic Obstructive Pulmonary Disease			
No	376,634 (61.0%)	5.19 (3.66)	5.17 (5.15-5.20)
Yes	241,046 (39.0%)	5.48 (3.73)	5.21 (5.18-5.24)
Coagulopathy			
No	553,501 (89.6%)	5.24 (3.62)	5.17 (5.14-5.19)
Yes	64,179 (10.4%)	5.87 (4.21)	5.35 (5.32-5.38)

Deficiency Anemia			
No	510,324 (82.6%)	5.22 (3.56)	5.18 (5.15-5.20)
Yes	107,358 (17.4%)	5.69 (4.23)	5.24 (5.21-5.27)
Depression			
No	459,295 (74.4%)	5.24 (3.56)	5.19 (5.16-5.21)
Yes	158,385 (25.6%)	5.49 (4.03)	5.18 (5.15-5.21)
Diabetes Complicated			
No	441,206 (71.4%)	5.21 (3.62)	5.18 (5.15-5.20)
Yes	176,474 (28.6%)	5.54 (3.87)	5.24 (5.21-5.27)
Diabetes Uncomplicated			
Characteristic	N (%)	Unadjusted LOS Mean (SD)	Adjusted LOS (95% Confidence Interval)
No	389,910 (63.1%)	5.21 (3.56)	5.19 (5.16-5.21)
Yes	227,770 (36.9%)	5.46 (3.91)	5.18 (5.15-5.21)
Drug Abuse			
No	602,863 (97.6%)	5.30 (3.66)	5.19 (5.16-5.21)
Yes	14,817 (2.4%)	5.62 (4.71)	5.14 (5.10-5.19)
Fluid and Electrolyte Disorders			
No	370,102 (59.9%)	5.05 (3.35)	5.10 (5.08-5.13)
Yes	247,578 (40.1%)	5.67 (4.12)	5.32 (5.29-5.34)
AIDS/HIV			
No	616,801 (99.9%)	5.30 (3.69)	5.18 (5.16-5.21)
Yes	879 (0.1%)	5.92 (4.13)	5.07 (4.91-5.23)
Hypertension complicated			
No	389,947 (63.1%)	5.12 (3.47)	5.19 (5.16-5.21)
Yes	227,733 (36.9%)	5.62 (4.03)	5.18 (5.16-5.21)
Hypertension Uncomplicated			
No	104,392 (16.9%)	5.17 (3.71)	5.32 (5.29-5.35)
Yes	513,288 (83.1%)	5.33 (3.69)	5.16 (5.13-5.19)
Hypothyroidism			

No	450,545 (72.9%)	5.29 (3.74)	5.19 (5.17-5.22)
Yes	167,135 (27.1%)	5.33 (3.57)	5.17 (5.14-5.20)
Liver Disease			
No	583,796 (94.5%)	5.27 (3.61)	5.18 (5.16-5.21)
Yes	33,884 (5.5%)	5.81 (4.82)	5.26 (5.22-5.30)
Lymphoma			
No	603,924 (97.8%)	5.29 (3.68)	5.18 (5.16-5.21)
Yes	13,756 (2.2%)	5.78 (4.09)	5.43 (5.38-5.48)
Metastatic Cancer			
No	590,033 (95.5%)	5.28 (3.68)	5.18 (5.15-5.20)
Yes	27,647 (4.5%)	5.85 (4.00)	5.43 (5.39-5.47)
Obesity			
No	514,524 (83.3%)	5.24 (3.65)	5.17 (5.15-5.20)
Yes	103,156 (16.7%)	5.62 (3.89)	5.27 (5.24-5.30)
Other Neurological Disorders			
No	501,296 (81.2%)	5.22 (3.48)	5.16 (5.14-5.19)
Yes	116,384 (18.8%)	5.67 (4.47)	5.28 (5.25-5.31)
Pulmonary Circulation Disorders			
No	539,536 (87.4%)	5.23 (3.63)	5.16 (5.14-5.19)
Yes	78,144 (12.6%)	5.78 (4.04)	5.34 (5.31-5.37)
Peptic Ulcer Disease excluding bleeding			
No	604,641 (97.9%)	5.29 (3.68)	5.19 (5.16-5.21)
Yes	13,039 (2.1%)	5.77 (4.42)	5.26 (5.21-5.31)
Peripheral Vascular Disorders			
No	434,811 (70.4%)	5.23 (3.61)	5.19 (5.16-5.21)
Yes	182,869 (29.6%)	5.48 (3.87)	5.18 (5.16-5.21)
Paralysis			
No	598,131 (96.8%)	5.28 (3.60)	5.18 (5.15-5.20)
Characteristic	N (%)	Unadjusted LOS Mean (SD)	Adjusted LOS (95% Confidence Interval)
Yes	19,549 (3.2%)	5.92 (5.79)	5.44 (5.39-5.48)

Psychoses			
No	600,389 (97.2%)	5.28 (3.64)	5.18 (5.15-5.20)
Yes	17,291 (2.8%)	5.96 (5.23)	5.52 (5.47-5.56)
Renal Failure			
No	401,389 (64.9%)	5.14 (3.48)	5.13 (5.10-5.16)
Yes	216,291 (35.1%)	5.61 (4.04)	5.29 (5.26-5.32)
Weight Loss			
No	542,299 (87.8%)	5.21 (3.55)	5.15 (5.12-5.17)
Yes	75,381 (12.2%)	5.95 (4.55)	5.48 (5.45-5.52)
Valvular Disease			
No	485,214 (78.6%)	5.24 (3.68)	5.19 (5.16-5.22)
Yes	132,466 (21.4%)	5.53 (3.72)	5.18 (5.15-5.21)
Solid Tumor without Metastasis			
No	524,918 (85.0%)	5.26 (3.66)	5.18 (5.15-5.20)
Yes	92,762 (15.0%)	5.57 (3.88)	5.23 (5.20-5.26)
Rheumatoid Arthritis/collagen			
No	569,670 (92.2%)	5.30 (3.71)	5.19 (5.16-5.21)
Yes	48,010 (7.8%)	5.36 (3.51)	5.17 (5.13-5.20)
Hospital Characteristic			
Bed Size			
>500	158,306 (25.6%)	5.72 (4.21)	5.45 (5.38-5.52)
350<, <=500	100,925 (16.3%)	5.54 (3.90)	5.38 (5.31-5.45)
200<, <=350	172,408 (27.9%)	5.36 (3.62)	5.23 (5.18-5.28)
<=200	186,041 (30.1%)	4.90 (2.94)	4.84 (4.80-4.88)
Urban Rural indicator			
Rural	93,573 (15.2%)	4.82 (2.75)	4.91 (4.86-4.95)
Urban	524,107 (84.8%)	5.43 (3.79)	5.24 (5.21-5.26)
Type of provider			
Nonprofit	460,368 (74.6%)	5.35 (3.68)	5.18 (5.15-5.21)

For profit	81,732 (13.2%)	5.30 (3.46)	5.23 (5.17-5.29)
Government	75,580 (12.2%)	5.28 (3.62)	5.18 (5.13-5.24)
Medical School Affiliation			
Major	121,922 (19.7%)	5.73 (4.28)	5.40 (5.34-5.47)
Limited	130,339 (21.1%)	5.42 (3.82)	5.24 (5.19-5.30)
Graduate	29,110 (4.7%)	5.49 (3.71)	5.32 (5.20-5.44)
No affiliation	336,309 (54.5%)	5.15 (3.30)	5.08 (5.04-5.11)

LOS, length of stay; SD, standard deviation; AIDS, acquired immune deficiency syndrome; HIV, human immunodeficiency virus.

^aLength of stay for admissions on day 4 or later as a function of the number of hospitalists providing care during the first 3 days of hospitalization, adjusted for patient characteristics, from a **two level multivariable** in Model 2 (for the period 01/01/2016 to 12/31/2018, 20% National Medicare data).