

Outcomes of Medicare Patients Admitted for Less Than 24 Hours: an Observational Study



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INTRODUCTION

Short-stay admissions are hospitalizations that meet inpatient criteria (i.e. “two-midnight rule”¹) but last ≤ 24 hours due to unanticipated clinical improvement, divergent opinions or miscommunication around necessary care, or usage of inpatient resources for outpatient or “social” needs. They are distinct from observation stays because they were anticipated to meet inpatient criteria at admission and reflect relatively mismatched expectations between admitting and discharging clinicians about hospital needs. Patients with short-stay admissions may have lower illness acuity or, conversely, similar illness acuity to patients with longer stays but inappropriately short hospitalizations. These differences may manifest in adverse, post-discharge outcomes among clinically ill patients discharged prematurely. To our knowledge, no studies have examined outcomes of short-stay admissions in comparison to longer admissions.

We aimed to compare emergency department (ED) and hospital utilization at 7 and 30 days post-discharge among Medicare patients admitted for ≤ 24 hours versus > 24 hours. This information may help discharging clinicians better manage the discharge process for short-stay admissions.

METHODS

In this observational study, we collected electronic health record data for Medicare beneficiaries hospitalized as inpatients on the hospitalist service at a 1,541-bed academic medical center from January 2015 to December 2018. We excluded inter-hospital transfers, patients discharged against medical advice (AMA), discharged to hospice, or who died in the hospital.¹ We focused on Medicare to minimize payor-based variations in inpatient criteria.

We collected data on age, sex, race, Charlson comorbidities², admission diagnosis³, severity of illness⁴, and admission and discharge times. We categorized admissions as lasting \leq

24 hours or > 24 hours. The primary outcomes were 7-day and 30-day ED utilization, observation, and readmission. We used chi-squared tests or Wilcoxon rank-sum tests to compare demographics and outcomes between the two groups. We randomly de-duplicated the sample so each patient was only represented once and used multiple logistic regression to test for associations between short-stay admission and primary outcomes while adjusting for collected covariates. We did a sensitivity analysis of patients discharged home to reduce potential confounding related to discharge to post-acute facilities. For outcomes, we used a p -value of < 0.05 , adjusted using Holm-Bonferroni correction for multiple comparisons⁵, as a threshold for statistical significance.

This study was exempted from full review by the institutional review board at Yale University.

RESULTS

There were 36,749 inpatient discharges among Medicare beneficiaries. After excluding 2,451 (6.7%) inter-hospital transfers, 320 (0.9%) discharges AMA, 1,065 (2.9%) discharges to hospice, and 412 (1.1%) in-hospital deaths, we included 32,511 encounters from 19,151 unique patients in our analysis. There were 684 (2.1%) short-stay admissions.

Compared with patients with longer admissions, patients with short-stay admissions were more likely to be younger, male, have fewer comorbidities, be admitted by the night shift (between 4:00 pm and 5:30 am), and have lower severity of illness ($p < 0.01$; Table 1).

Patients with short-stay admissions were more likely to return to the ED within 7 days of discharge (aOR 1.48 [95% CI 1.12, 1.97], $p = 0.03$). However, they were less likely to be readmitted within 30 days (0.62 [0.46, 0.86], $p = 0.02$) of discharge (Table 2).

In analyzing only discharges to home, 7-day ED use (1.51 [1.13, 2.00], $p = 0.03$) and 30-day readmission (0.65 [0.47, 0.89], $p = 0.04$) remained significant.

DISCUSSION

We found that patients with short-stay admissions, though a small proportion of admissions, had distinct outcomes compared with patients with longer admissions. There was a higher 7-day ED utilization rate in patients discharged in ≤ 24 hours, which may signal unresolved issues from admission,

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Table 1 Characteristics and Outcomes of Hospitalized Patients by Admission Category

	Admitted ≤ 24 hours n = 684	Admitted > 24 hours n = 31,827	p-value
Age, median years (IQR)	70 (62–80)	74 (65–84)	< 0.01
Female, n (%)	345 (50.4)	17,777 (55.9)	< 0.01
Race, n (%)			0.01
White	512 (75.1)	23,372 (73.8)	
Black	116 (17.0)	6,456 (20.4)	
Other	54 (7.9)	1,820 (5.8)	
Charlson comorbidity count, median (IQR)	3 (1–4)	3 (2–5)	< 0.01
Admitted between 4:00 pm and 5:30 am	497 (72.7)	14,668 (46.1)	< 0.01
Admitted on a weekend	148 (21.6)	7,663 (24.1)	0.14
Length of stay, median days (IQR)	0.85 (0.74–0.93)	4.1 (2.8–6.4)	—
Most frequent admission diagnoses	1. Cardiovascular diseases: 133 (20.3) 2. Signs, symptoms, and ill-defined conditions*: 62 (9.5) 3. Diseases of the urinary system: 53 (8.1) 4. Respiratory infections: 48 (7.3)	1. Cardiovascular diseases: 4,545 (15.0) 2. Diseases of the urinary system: 3,252 (10.8) 3. Signs, symptoms, and ill-defined conditions*: 2,878 (9.5) 4. Respiratory infections: 2,122 (7.0)	< 0.01
Diagnosis severity level†			< 0.01
Uncomplicated	437 (63.9)	13,535 (42.5)	
Complication or comorbidity present	156 (22.8)	8,304 (26.1)	
Major complication or comorbidity present	91 (13.3)	9,988 (31.4)	
Emergency department use, n (%)			
Within 7 days	98 (14.3)	3,731 (11.7)	0.16‡
Within 30 days	194 (28.4)	9,577 (30.1)	0.33‡
Observation stay, n (%)			
Within 7 days	9 (1.3)	651 (2.0)	0.36‡
Within 30 days	31 (4.5)	1,904 (6.0)	0.33‡
Readmissions, n (%)			
Within 7 days	32 (4.7)	2,320 (7.3)	0.04‡
Within 30 days	91 (13.3)	6,717 (21.1)	< 0.01‡

*Includes admission diagnosis codes such as abdominal pain, fever, nausea, syncope, and weakness

†As determined by discharge Medicare Severity Diagnosis Related Group severity level

‡Adjusted p-value using Holm-Bonferroni correction for multiple comparisons

ineffective discharge guidance, or inefficiencies transitioning care to the outpatient setting. This suggests that further attention may be needed to enhance safety or care coordination for these discharges.⁶ We also found that patients with short-stay admissions were less likely to be readmitted at 30 days, which suggests that the severity of their presenting condition may not

have been as high compared to patients of longer admissions. Additional work may aim to better identify, triage, and address concerns for patients of lower illness acuity.

LIMITATIONS

We used data from a single institution; healthcare utilization at other institutions was not captured. However, the hospital is the major regional care provider.

CONCLUSIONS

Medicare beneficiaries admitted and discharged within 24 hours may benefit from additional support at or after discharge to prevent increased ED utilization. Future work may also focus on preventing hospitalization for lower acuity concerns.

Table 2 Emergency Department Use, Observation, and Readmission After Discharge for Admissions ≤ 24 Hours Versus > 24 Hours

	Unadjusted OR [95% CI]	p-value†	Adjusted OR [95% CI]*	p-value†
Emergency department use within 7 days	1.36 [1.03, 1.80]	0.12	1.48 [1.12, 1.97]	0.03
Emergency department use within 30 days	0.99 [0.80, 1.22]	0.90	1.10 [0.88, 1.37]	0.39
Observation stay within 7 days	0.38 [0.12, 1.19]	0.19	0.41 [0.13, 1.30]	0.26
Observation stay within 30 days	0.60 [0.35, 1.05]	0.23	0.64 [0.37, 1.12]	0.37
Readmission within 7 days	0.50 [0.30, 0.86]	0.06	0.58 [0.34, 0.99]	0.19
Readmission within 30 days	0.54 [0.40, 0.74]	< 0.01	0.62 [0.46, 0.86]	0.02

*Adjusted for age, sex, race, insurance, night-shift admission (admitted between 4:00 pm and 5:30 am), weekend admission, presence of individual Charlson comorbidities, admission diagnosis, and Medicare Severity Diagnosis Related Group severity level

†Adjusted p-value using Holm-Bonferroni correction for multiple comparisons

Kevin Chen, MD, MHS^{1,2,3,4}
Mia Djulbegovic, MD, MHS^{1,2,5}
Ritu Agarwal, MBBS, MS⁶
Sarwat I. Chaudhry, MD^{1,7}

¹National Clinician Scholars Program, Yale University School of Medicine, New Haven, CT, USA

²Veterans Affairs Connecticut Healthcare System, West Haven, CT, USA

³Office of Ambulatory Care, New York City Health + Hospitals,

New York, NY, USA

⁴Division of General Internal Medicine and Clinical Innovation, New York University Grossman School of Medicine,

New York, NY, USA

⁵Division of Hematology and Oncology, University of Pennsylvania Perelman School of Medicine,

Philadelphia, PA, USA

⁶Joint Data Analytics Team, Yale University,

New Haven, CT, USA

⁷Section of General Internal Medicine, Yale School of Medicine,

New Haven, CT, USA

Corresponding Author: Kevin Chen, MD, MHS; Office of Ambulatory Care, New York City Health + Hospitals, New York, NY, USA (e-mail: research@kchenmd.com).

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Declarations:

Conflict of Interest: Dr. Chen completed an internship with 3M Health Information Systems in 2019. Dr. Chaudhry serves as a reviewer for the CVS State of Connecticut Caremark Clinical Program. Drs. Djulbegovic and Agarwal have no conflicts of interest to report.

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