

ORIGINAL RESEARCH

Is Weekend Discharge Associated With Hospital Readmission?

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BACKGROUND: Although recent evidence suggests worse outcomes for patients admitted to the hospital on a weekend, the impact of weekend discharge is less understood.

METHODS: Utilizing the 2012 California Office of Statewide Health Planning and Development database, the impact of weekend discharge on 30-day hospital readmission rates for patients admitted with acute myocardial infarction (AMI), congestive heart failure (CHF), or pneumonia (PNA) was investigated.

RESULTS: Out of 266,519 patients, 60,097 (22.5%) were discharged on a weekend. Unadjusted 30-day hospital readmission rates were similar between weekend and weekday discharges (AMI: 21.9% vs 21.9%;

CHF: 15.4% vs 16.0%; PNA: 12.1% vs 12.4%). Patients discharged on a weekday had a longer length of stay and were more often discharged to a skilled nursing facility. However, in multivariable logistic regression models, weekend discharge was not associated with readmission (AMI: odds ratio [OR] 1.02 [95% CI: 0.98-1.06]; CHF: OR 0.99 [95% CI: 0.94-1.03]; PNA: OR 1.02 [95% CI: 0.98-1.07]).

CONCLUSIONS: Among patients in California with AMI, CHF, and PNA, discharge on a weekend was not associated with an increased hospital readmission rate. *Journal of Hospital Medicine* 2015;10:731-737. © 2015 Society of Hospital Medicine

Hospital readmission, defined as an admission to a hospital within 30 days of discharge from an acute-care hospitalization, is associated with short-term morbidity, mortality, and medical costs.¹ In 2013, the Patient Protection and Affordable Care Act began assigning financial penalties to hospitals based on performance against benchmarks on readmission for acute myocardial infarction (AMI), pneumonia (PNA), and congestive heart failure (CHF) through its Hospital Readmission Reduction Program (HRRP).² In its third year, the program recently announced penalties for 2,610 hospitals that will total over \$428 million.³ Despite increased attention to this issue, few interventions have been identified that effectively reduce hospital readmissions.^{4,5}

Hospital discharge is a complex process that aims to achieve the safe transfer of care of a hospitalized patient to another setting (eg, home, skilled nursing facility [SNF]). Success depends on adequate staffing of physicians, nurses, case managers, social workers, and pharmacists; clear communication among patients and providers; and integrated coordination of care. Although much focus has been placed on the association between weekend hospital admission and increased mortality,⁶⁻⁸ very little is known about the

impact of weekend hospital discharge on outcomes, specifically hospital readmission rates. Furthermore, previous studies on this topic, based on Canadian data, have produced conflicting results.⁹⁻¹¹

Staffing of physicians, physician extenders (eg, physician assistants or nurse practitioners), nurses, case managers, social workers, and ancillary staff (eg, physical and occupational therapists) are all typically reduced on the weekend. Patients may be cared for by covering healthcare providers. These factors may have important implications on the timeliness of discharge, accuracy of discharge instructions, safety of discharge (eg, clearance by physical therapy), and medication reconciliation, among others. Clinic offices are more likely to be closed, and therefore, some follow-up appointments may inadvertently not be scheduled, and lack of timely postdischarge follow-up may be associated with higher rates of readmission.¹² Reduced outpatient pharmacy availability may also cause delays in patients receiving their medications,¹³ which may exacerbate failed transition to the outpatient setting due to medication noncompliance.¹⁴

Based on this rationale, the current study was designed to investigate the association between weekend discharge and 30- and 90- day readmissions in patients hospitalized for medical diagnoses included in Centers for Medicare and Medicaid Services' HRRP.¹⁵ To do so, a large-state, all-payer discharge database with individual patient record linkage numbers (RLN) was selected to capture all readmissions, even those to a different hospital. We hypothesized that patients who are discharged on a weekend would have higher hospital readmission rates compared to those discharged on a weekday.

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METHODS

Approval was obtained from both the California Committee for the Protection of Human Subjects and the Stanford University Institutional Review Board. The California Office of State Health Planning and Development (OSHPD) 2012 Patient Discharge Data (PDD) was utilized for this study. The OSHPD-PDD contains records for all patients admitted and eventually discharged from every general, acute, nonfederal hospital within the state. Demographic variables contained in the dataset include age, gender, race, and a unique RLN (an individually assigned number based on the patient's social security number and other demographics) to associate discharged patients with subsequent hospitalizations. Clinical information collected included principal diagnosis (indication for admission), 24 additional diagnoses with an indicator as to whether or not the condition was present on admission (POA) to differentiate comorbidities from complications, and principle procedure codes. Details about the admission included date of admission and discharge, admission type (scheduled or unscheduled), expected payer/insurance and disposition (home, acute rehabilitation, skilled nursing facility, residential facility, other). Details about the hospital included a unique identification number to indicate the location of care for both index/discharge and subsequent readmission.

International Classification of Disease, Ninth Edition, Clinical Modification (ICD-9-CM) coding schema were used to identify all patients admitted with the principal diagnosis of AMI (ICD-9-CM code 410.xx), CHF (428.xx), or PNA (480.xx-486.xx). We excluded patients who were coded as having in-hospital mortality, as these patients would not be eligible for readmission, those who were transferred to a different inpatient acute-care facility, and those with invalid RLNs. Patients were separated into 2 groups based on the day of discharge. Weekday was defined as Monday through Friday, whereas weekend was defined as Saturday and Sunday. The Charlson Comorbidity Index was calculated based on POA comorbidities.

Demographic data, hospital variables, and readmission rates were directly compared for patients discharged on a weekend compared to weekday after admission for AMI, CHF, or PNA. Hospital readmission was defined as the first inpatient hospitalization for any reason at either 30 or 90 days following discharge from an index acute-care hospitalization. Hospital identification codes were used to determine whether the readmission occurred at the index (discharging) hospital or to a different facility. The principal diagnosis for the subsequent admission was assessed to identify the most common reasons for readmission.

The χ^2 test and Student *t* test were used to compare mean values between the 2 groups when appropriate,

with statistical significance set as $P < 0.05$. Univariate and multivariable logistic regression models were built to estimate the odds of hospital readmission based on weekend versus weekday discharge after controlling for age, gender, race, Charlson Comorbidity Index, discharge disposition, payer status, length of stay, presence of complication, and admission type. All statistical analyses were 2-tailed and performed using SAS 9.3 for windows (SAS Institute Inc., Cary, NC). The odds ratio (OR) was considered significant when it was not equal to 1, the 95% confidence interval (CI) did not include 1, and the *P* value was less than 0.05.

RESULTS

Patient Characteristics

There were 266,519 patients hospitalized with a principal diagnosis of AMI, CHF, or PNA in California during 2012 and met all inclusion criteria. The cohort consisted of 77,853 (29.2%) with AMI, 91,327 (34.3%) with CHF, and 97,339 (36.5%) with PNA. A total of 60,097 (22.5%) patients were discharged on the weekend compared to 206,422 (77.5%) on a weekday, which was similar across diagnosis groups. Differences in gender, age, race, Charlson comorbidity score, insurance status, type of admission, or occurrence of complications between patients who were discharged on the weekend versus weekday are listed in Table 1. Patients discharged on a weekend had a shorter average length of stay (LOS) (AMI: 4.0 ± 5.6 days vs 4.6 ± 7.7 days; CHF: 5.1 ± 9.3 vs 6.0 ± 34.1 ; PNA: 5.0 ± 11.7 vs 5.7 ± 10.7). A higher proportion of these patients were discharged to home (AMI: 67.1% vs 63.8%; CHF: 53.3% vs 49.4%; PNA: 57.0% vs 52.9%), whereas a smaller proportion were discharged to an SNF (AMI: 7.0% vs 9.6%; CHF: 11.2% vs 15.9%; PNA: 12.8% vs 17.8%).

Rate, Reason, and Location of Readmission

Table 2 shows overall rates of readmission. Among all patients, there were no significant differences in the unadjusted readmission rates for patients being discharged on a weekend versus weekday at either 30 days (16.7% vs 17.0%, $P = 0.14$) or 90 days (26.9% vs 27.5%, $P = 0.05$) (Table 2). Unadjusted 30-day readmission rates were similar between the 2 groups for AMI (21.9% vs 21.9%, $P = 0.94$) and PNA (12.1% vs 12.4%, $P = 0.28$), whereas they were higher for weekday discharges in CHF (15.4% vs 16.0%, $P = 0.04$). Similar results were seen for 90-day readmission rates. To elucidate the impact of discharge disposition, a subset analysis was performed based on day of discharge and disposition (Figure 1). There was no difference in rates of readmission among patients discharged home on a weekend versus weekday (AMI: 21.3% vs 21.1%, $P = 0.78$; CHF: 12.2% vs 12.6%, $P = 0.29$; PNA: 8.3% vs 8.6%, $P = 0.29$).

TABLE 1. Cohort Demographics

	AMI		CHF		PNA	
	Weekend	Weekday	Weekend	Weekday	Weekend	Weekday
No. (%)	18,061 (23.2)	59,792 (76.8)	20,487 (22.4)	70,840 (77.6)	21,549 (22.1)	75,790 (77.9)
Age, y						
0-44	4.7	4.5	4.5	4.1	9.4	8.6
45-54	13.1	13.0	8.5	8.3	9.8	9.9
55-64	22.6	22.4	14.3	14.6	14.9	14.9
65-74	22.5	22.7	19.2	18.7	18.3	18.0
75-84	21.4	21.4	26.4	26.3	24.1	24.0
85+	15.6	16.0	27.2	28.0	23.5	24.5
Mean (SD)	68.5 (14.3)	68.7 (14.3)	73.3 (15.1)	3.6 (15.0)	70.0 (17.6)	70.5 (17.4)
Sex						
Male	62.0	61.7	51.7	51.4	47.9	47.0
Female	38.0	38.3	48.3	48.6	52.1	52.1
Race						
White	63.5	62.9	58.7	58.5	63.0	62.4
Black	6.9	7.3	12.0	12.1	7.7	8.0
Hispanic	19.5	20.0	20.3	20.6	20.4	20.7
API	10.0	9.7	9.0	8.8	8.8	8.9
Charlson Comorbidity Index						
0	30.7	30.1	9.4	9.5	23.0	22.2
1	25.1	24.9	19.5	19.8	25.7	26.4
2	14.9	15.2	20.4	20.3	17.3	17.4
≥3	29.2	29.8	50.8	50.4	34.0	34.1
Mean (SD)	2.1 (2.2)	2.1 (2.2)	3.0 (2.3)	3.0 (2.3)	2.4 (2.6)	2.4 (2.5)
Payer status						
Private	25.4	25.1	11.3	10.7	15.7	14.4
Medicare	57.6	57.9	72.7	73.1	67.1	68.1
Medicaid	8.0	8.0	10.0	10.6	11.5	11.8
No insurance	4.2	4.0	2.7	2.3	2.6	2.5
Unknown	4.8	4.9	3.3	3.3	3.2	3.2
Complication						
Urinary tract infection	6.0	6.8	10.3	10.8	10.2	11.0
Acute MI	6.7	6.9	2.7	2.6	1.2	1.2
DVT/PE	0.02	0.02	0.01	0.01	0.03	0.03
Pneumonia	0.06	0.05	0.09	0.08	0.1	0.1
Hemorrhage	1.7	1.7	1.5	1.5	1.2	1.1
Sepsis	3.5	3.6	6.2	6.0	7.4	7.6
Mean length of stay (SD)	4.0 (5.6)	4.6 (7.7)	5.1 (9.3)	6.0 (34.1)	5.0 (11.7)	5.7 (10.7)
Disposition						
Home	67.1	63.8	53.3	49.4	57.0	52.9
Acute rehabilitation	1.9	3.2	0.7	0.9	0.5	0.7
Skilled nursing facility	7.0	9.6	11.2	15.9	12.8	17.8
Residential facility	0.4	0.5	0.9	1.0	1.1	1.4
Other	23.6	23.0	33.9	32.8	28.6	27.2
Admission type						
Elective	8.9	10.1	7.9	9.1	7.1	7.6
Unplanned	91.0	89.9	92.1	90.9	92.9	92.3

NOTE: All numbers are expressed in percentage of entire cohort unless otherwise stated. Abbreviations: AMI, acute myocardial infarction; API, Asian/Pacific Islander; CHF, congestive heart failure; DVT/PE, deep vein thrombosis and/or pulmonary embolism; MI, myocardial infarction; PNA, pneumonia; SD, standard deviation.

TABLE 2. Unadjusted Readmission Rates Based on Day of Discharge

	AMI			CHF			PNA		
	Weekend	Weekday	P Value	Weekend	Weekday	P Value	Weekend	Weekday	P Value
30-day readmission (%)	3,954 (21.9)	13,106 (21.9)	0.94	3,162 (15.4)	11,366 (16.0)	0.04	2,608 (12.1)	9,380 (12.4)	0.28
90-day readmission (%)	5,253 (29.1)	17,344 (29.0)	0.84	5,994 (29.3)	21,355 (30.2)	0.008	4,698 (21.8)	16,910 (22.3)	0.11

NOTE: Abbreviations: AMI, acute myocardial infarction; CHF, congestive heart failure; PNA, pneumonia.

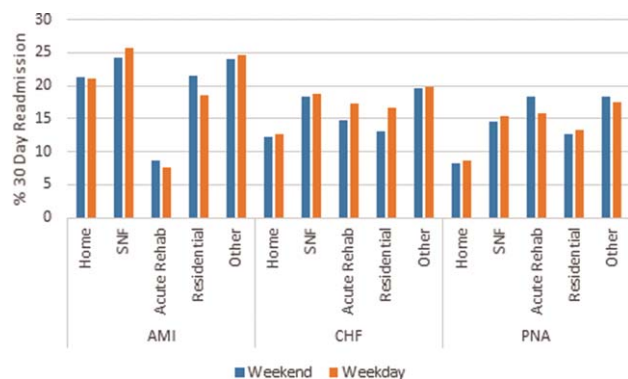


FIG. 1. Thirty-day readmission rate for AMI, CHF, and PNA based on discharge disposition. Abbreviations: AMI, acute myocardial infarction; CHF, congestive heart failure; PNA, pneumonia; SNF, skilled nursing facility.

The reason for hospital readmission was most frequently related to the principal diagnosis. Among patients discharged after hospitalization for AMI, 45.3% of readmissions had a principal diagnosis of AMI, whereas 13.9% listed readmission for angina or coronary artery disease. Of CHF discharges, at least 26.7% of readmissions were for CHF. PNA was the principal diagnosis in 19.8% of readmissions after admission for PNA. A significant proportion of patients (AMI: 64.8%, CHF: 35.0%, PNA: 32.9%) were readmitted to a different hospital than the discharging hospital.

Predictors of Readmission

On univariate logistic regression, discharge on a weekend was not associated with hospital readmission for patients admitted with AMI (OR: 1.0, 95% CI: 0.96-1.04) or PNA (OR: 0.97, 95% CI: 0.93-1.02) but was inversely associated for CHF (OR: 0.96, 95% CI: 0.91-1.0). In multivariable models, weekend discharge was not associated with increased risk of readmission for any diagnosis (AMI [OR: 1.02, 95% CI: 0.98-1.07], CHF [OR: 0.99, 95% CI: 0.95-1.03], or PNA [OR: 1.02, 95% CI: 0.98-1.07]; Table 3).

Increasing age, male gender, black race, greater Charlson Comorbidity Index, occurrence of any complication, and increased LOS were all associated with need for readmission on univariate analysis, though many of these associations weakened on multivariable analysis (Table 3). The effect of payer status on readmission was complex. Compared to private insurance, Medicare was associated with readmissions for patients with PNA (OR: 1.29, 95% CI: 1.22-1.37) but not AMI (OR: 1.02, 95% CI: 0.98-1.06) or CHF (OR: 1.04, 95% CI: 0.98-1.11). Medicaid insurance was associated with readmission for CHF (OR: 1.20, 95% CI: 1.12-1.30) and PNA (OR: 1.28, 95% CI: 1.18-1.38) but appeared to be protective from readmission for AMI (OR: 0.89, 95% CI: 0.83-0.96). Lack of insurance was associated with decreased odds of readmission for all diagnoses ($P < 0.05$ for all models).

Models predicting 90-day readmission rates showed similar results in all categories; therefore, the data are not shown.

DISCUSSION

We used a California statewide discharge database that linked individual patient records from all nonfederal hospitals to examine 30- and 90-day hospital readmissions for CHF, AMI, and PNA. We hypothesized, but did not find, that weekend hospital discharge would be associated with higher hospital readmission rates. We did find other factors that were associated with hospital readmissions, including race, age, greater comorbidities, male gender, and discharge to an SNF. Nearly half of patients were readmitted for the same diagnosis as the initial discharge diagnosis, and nearly two-thirds of the patients were readmitted to a hospital different from the discharging hospital.

Our study found some findings similar to prior investigations. First, the factors that predicted hospital readmission were complex and included age, race, gender, comorbidities, payer status, length of hospital stay, and the occurrence of a complication; most of these factors persisted after multivariable analysis but were not necessarily consistent across all admission diagnoses.¹⁶⁻¹⁸ One finding of particular interest was the impact of insurance status. Specifically, lack of insurance was inversely associated with hospital readmission; this finding warrants further investigation. Our study is also similar to others in that we found that the most common reasons for readmission are typically related to the reason for the principal admission. Dharmarajan et al. previously studied the reason for readmission among hospitalized Medicare patients with AMI, CHF, and PNA, and found similarly high rates of identical admission diagnoses.¹⁹ Furthermore, in our study, between 32% and 65% of 30-day readmissions were to a hospital different than the discharging facility. Although few prior studies have had the ability to assess readmission to alternative hospitals, those who have done so in the past have found similar rates of divergence from the index facility.^{20,21}

Despite the apparent similarities to other studies, the current research question was specifically designed to investigate the weekend effect of hospital discharge. The term *weekend effect* refers to a phenomenon of worse clinical outcomes (eg, morbidity,²² mortality,^{6,7} intensive care unit [ICU] readmission,²³ delays in appropriate diagnostic imaging^{24,25} and intervention,^{26,27} LOS,²⁸ and hospital costs²⁹) for care delivered on a weekend. In a landmark study, Bell and Redelmeier demonstrated increased in-house mortality for patients with ruptured abdominal aortic aneurysm, pulmonary embolism, or acute epiglottitis admitted through the emergency department on a weekend compared to weekday.⁶ After controlling for patient variables, the association persisted, suggesting system-related factors were contributory. Similarly, Kostis et al. showed that

TABLE 3. Logistic Regression Analysis of Variables Predicting 30-Day Readmission

	AMI		CHF		PNA	
	Univariate OR (95% CI)	Multivariable OR (95% CI)	Univariate OR (95% CI)	Multivariable OR (95% CI)	Univariate OR (95% CI)	Multivariable OR (95% CI)
Weekend discharge	1 (0.96-1.04)	1.02 (0.98-1.06)	0.96 (0.91-1)	0.99 (0.94-1.03)	0.97 (0.93-1.02)	1.02 (0.98-1.07)
Age, y						
0-44	—	—	—	—	—	—
45-54	1.02 (0.92-1.12)	0.96 (0.87-1.07)	1.04 (0.93-1.16)	1.00 (0.89-1.11)	1.08 (0.98-1.19)	0.93 (0.84-1.03)
55-64	1.11 (1.02-1.22)	1.00 (0.91-1.10)	1.11 (1.01-1.23)	0.97 (0.88-1.08)	1.23 (1.13-1.34)	0.94 (0.86-1.03)
65-74	1.31 (1.19-1.43)	1.04 (0.94-1.15)	1.1 (1-1.22)	0.90 (0.81-1.01)	1.29 (1.19-1.41)	0.87 (0.79-0.96)
75-84	1.29 (1.18-1.41)	0.94 (0.85-1.05)	1.06 (0.97-1.17)	0.84 (0.75-0.93)	1.37 (1.27-1.49)	0.87 (0.79-0.95)
85+	1.03 (0.94-1.13)	0.72 (0.64-0.81)	0.98 (0.89-1.08)	0.76 (0.68-0.84)	1.31 (1.2-1.41)	0.78 (0.71-0.86)
Gender						
Female	—	—	—	—	—	—
Male	1 (0.97-1.04)	1.1 (1.05-1.14)	1.06 (1.02-1.1)	1.08 (1.04-1.12)	1.13 (1.09-1.18)	1.15 (1.10-1.19)
Race						
White	—	—	—	—	—	—
Black	1.17 (1.1-1.25)	1.12 (1.05-1.20)	1.06 (1-1.12)	1.03 (0.97-1.09)	1.11 (1.04-1.19)	1.07 (0.99-1.15)
Hispanic	1.11 (1.06-1.16)	1.12 (1.06-1.17)	1.05 (1-1.1)	1.04 (1.00-1.10)	0.93 (0.89-0.98)	0.95 (0.90-1.00)
API	1.14 (1.07-1.2)	1.09 (1.03-1.16)	1.01 (0.95-1.08)	1.00 (0.94-1.07)	0.97 (0.91-1.04)	0.93 (0.86-0.99)
Charlson Comorbidity Index						
0	—	—	—	—	—	—
1	1.54 (1.46-1.62)	1.40 (1.32-1.48)	1.02 (0.95-1.1)	1.0 (0.92-1.08)	1.19 (1.12-1.26)	1.11 (1.04-1.19)
2	1.78 (1.69-1.89)	1.60 (1.51-1.70)	1.16 (1.08-1.25)	1.11 (1.03-1.20)	1.43 (1.34-1.53)	1.22 (1.14-1.31)
≥3	2.07 (1.97-2.17)	1.83 (1.73-1.93)	1.41 (1.32-1.51)	1.24 (1.15-1.32)	1.79 (1.69-1.89)	1.40 (1.31-1.48)
Payer status						
Private	—	—	—	—	—	—
Medicare	1.02 (0.98-1.06)	0.89 (0.84-0.95)	1.04 (0.98-1.11)	1.04 (0.98-1.12)	1.29 (1.22-1.37)	1.06 (0.98-1.13)
Medicaid	0.89 (0.83-0.96)	0.83 (0.77-0.89)	1.2 (1.12-1.3)	1.23 (1.13-1.33)	1.28 (1.18-1.38)	1.18 (1.09-1.28)
No insurance	0.52 (0.46-0.58)	0.60 (0.53-0.67)	0.66 (0.57-0.76)	0.79 (0.68-0.91)	0.64 (0.54-0.75)	0.73 (0.61-0.87)
Unknown	0.71 (0.65-0.78)	0.77 (0.70-0.84)	0.91 (0.81-1.03)	1.02 (0.9-1.15)	0.9 (0.79-1.03)	0.93 (0.81-1.06)
Disposition						
Home	—	—	—	—	—	—
Acute care	0.32 (0.27-0.37)	0.35 (0.29-0.41)	1.42 (1.18-1.71)	1.2 (1.05-1.55)	2.08 (1.69-2.56)	1.64 (1.32-2.03)
SNF	1.27 (1.2-1.34)	1.18 (1.10-1.26)	1.61 (1.53-1.7)	1.54 (1.46-1.63)	1.9 (1.81-2.01)	1.61 (1.52-1.71)
Residential facility	0.89 (0.68-1.15)	0.94 (0.72-1.24)	1.31 (1.1-1.58)	1.40 (1.16-1.69)	1.61 (1.37-1.89)	1.52 (1.29-1.80)
Other	1.21 (1.16-1.26)	1.10 (1.05-1.15)	1.72 (1.66-1.79)	1.59 (1.52-1.66)	2.31 (2.21-2.41)	1.88 (1.79-1.98)
Length of stay*	1.04 (1.02-1.05)	0.89 (0.87-0.90)	1.20 (1.19-1.22)	1.09 (1.08-1.11)	1.31 (1.29-1.32)	1.13 (1.1-1.14)
Any complication	3.14 (3.02-3.26)	2.61 (2.50-2.73)	1.52 (1.46-1.59)	1.35 (1.29-1.41)	1.70 (1.62-1.78)	1.39 (1.32-1.45)
Admission type						
Elective	—	—	—	—	—	—
Unplanned	0.28 (0.27-0.29)	0.33 (0.31-0.34)	0.56 (0.54-0.59)	0.57 (0.53-0.6)	0.39 (0.37-0.42)	0.45 (0.42-0.48)

NOTE: Abbreviations: AMI, acute myocardial infarction; API, Asian/Pacific Islander; CHF, congestive heart failure; CI, confidence interval; OR, odds ratio; PNA, pneumonia; SNF, skilled nursing facility. *Coefficient should be interpreted as odds ratio per doubling length of stay.

patients admitted to the hospital on a weekend with AMI had higher 30-day mortality rates compared to those with weekday admission.⁷ Finally, Aylin et al. demonstrated that mortality was 44% higher for patients undergoing elective surgery on a Friday and 82% higher for surgery on a weekend compared to a Monday.³⁰

Despite this robust literature, fewer studies have evaluated the relationship between timing of discharge and outcomes. Much of the initial research has been focused on timing of discharge from the ICU. For example, transfer out of the ICU at night has been associated with higher in-hospital mortality³¹⁻³⁵ as well as ICU readmission.^{36,37} Discharge from the ICU on a weekend has been associated with increased mortality in some studies²³ but not in others.^{35,38} Van Walraven and Bell were the first to investigate the

impact of weekend hospital discharge on outcomes. In their analysis of all discharges from Ontario hospitals between 1990 and 2000, patients discharged on a Friday were at increased risk of death and 30-day readmission compared to discharge on a Wednesday.⁹ Beck et al. performed a similar study in pediatric patients but did not find a statistically significant effect of Friday discharge on readmission rates.³⁹ McAlister et al. specifically studied the effect of weekend (Saturday or Sunday) discharge on patients with CHF by analyzing discharges from Alberta, Canada hospitals between 1999 and 2009. Despite being comprised of lower-risk patients, weekend discharge was associated with greater rates of 30- and 90-day death and hospital readmission.¹⁰ Conversely, McAlister et al. evaluated general medicine discharges from teaching hospitals in Alberta, Canada between 2009

and 2011 and found no difference in hospital readmission rates among those discharged on a weekend versus weekday.¹¹ The current investigation is the first to study hospitals in the United States to address this topic, an important consideration given differences in American and Canadian healthcare systems. Nevertheless, our results are similar to those of McAlister et al.,¹¹ who found no difference in hospital readmission rates based on day of discharge among patients with AMI, CHF, or PNA.

One potential explanation for finding a lack of correlation between weekend discharge and readmissions is that patients at higher risk for readmission are already selected toward weekday discharge. Our study found that patients discharged to an SNF, a group with higher odds of readmission, were less often discharged on a weekend. There may be other unmeasurable factors that differ between patients discharged on weekends versus weekdays. Also, factors that bias healthcare providers' decision making on timing of discharge are difficult to quantify and may differ between the 2 groups. Although our study hypothesis was driven by the perception that weekend discharges may fare poorly because of inadequate resources on the weekend, an alternative explanation for finding no association may be that current systems in place already do an effective job of discharge coordination on the weekend. Despite fears that staffing and equipment are significantly reduced during the weekend, perhaps weekend discharge resources are not the limiting factor in efforts to reduce readmissions.

Our results challenge the idea that weekend discharges predict hospital readmissions in California and argue for the relative safety of weekend discharges. Based on these findings, the routine delay in discharge of the complex medical patient until Monday for fear of discharge on a weekend does not seem warranted. Avoiding unnecessary delays in discharge should have positive effects on healthcare costs by reducing LOS. Two additional implications of our work are that single institution studies may underestimate readmission rates,⁴⁰ and that discharge to an SNF should receive special consideration in calculation of hospital-level penalties for subsequent readmissions, as this group is associated with particularly higher risk.

There are some limitations to our study that should be acknowledged. The use of administrative data has well known limitations and the possibility of coding inaccuracy cannot be excluded.⁴¹ Certain factors that could potentially differ between groups, such as illness severity, as well as details on the discharge process, were not available in this administrative database. In addition, elective readmissions were not excluded from the study. Also, because of the way the data were coded, a significant percentage of discharge dispositions were unknown. Finally, although morbidity and mortality have been studied in previous

reports,^{9,10,39} these data were not available for the current study, limiting the applicability of its conclusions.

CONCLUSIONS

In conclusion, among patients admitted with AMI, CHF, or PNA in California, discharge on a weekend is not associated with hospital readmission. Future studies on hospital readmissions should use a population-based approach to accurately capture all readmissions following discharge.

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