

BRIEF REPORT

Pediatric Weekend Admission and Increased Unplanned Readmission Rates

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Outcomes for patients hospitalized on weekends are often worse for adults—the so-called “weekend effect.” Less is known about the weekend effect for children. We examined 55,383 hospitalizations at a tertiary care children's hospital. We used logistic regression to examine the associations of weekend admission and weekend discharge with unplanned 30-day readmission. We adjusted analyses for patient and hospitalization characteristics including number of complex chronic conditions, technology dependency, and length of stay. The 30-day unplanned readmission rate was 10.3%. Children admitted on the

weekend had significantly higher odds of unplanned readmission compared to children admitted on weekdays (adjusted odds ratio = 1.09 [95% confidence interval: 1.004–1.18]). In contrast, being discharged on the weekend was not associated with readmission. In conclusion, children admitted on the weekend have higher rates of 30-day unplanned readmission than children admitted during the week, suggesting care differences on the weekend related to initial clinical management rather than discharge planning. *Journal of Hospital Medicine* 2015;10:743–745. © 2015 Society of Hospital Medicine

Patient outcomes tend to be worse for adults admitted on the weekend compared to the weekday.^{1–4} In pediatric populations, urgent surgeries on weekends are associated with increased morbidity and mortality⁵; however, studies of mortality and admission timing in the pediatric critical care setting are mixed.^{6,7} Hospital readmission is considered a potential marker of hospital quality. We hypothesized that (1) being admitted and (2) being discharged on the weekend would adversely affect 30-day unplanned readmission for pediatric patients.

METHODS

Population

All discharges from January 1, 2006 through December 31, 2012 from C. S. Mott Children's Hospital were initially eligible. All hospitalizations were considered potential index admissions; therefore, children may contribute more than 1 hospitalization to the dataset. We excluded hospitalizations in which the patient died, was transferred to another institution, was discharged against medical advice, or was discharged to hospice. Newborns admitted to a normal newborn service were also excluded, as they do not represent a typical hospitalization for illness. Among

newborns admitted to a higher-intensity clinical service (eg, special care nursery or neonatal intensive care), we also excluded newborns with a length of stay <5 days, given the typical length of stay of up to 4 days for uncomplicated delivery via Cesarean section that would indicate infants for whom precautionary measures had been taken but there was low estimated health risk. We used International Classification of Diseases, Ninth Revision codes to identify children with complex chronic conditions (CCCs) and technology dependency.⁸

Outcome

We examined unplanned readmission within 30 days of discharge. We defined unplanned readmission as a readmission that was not entered into the hospital registration system at least 24 hours before discharge.⁹ Additionally, we performed sensitive analyses examining any 30-day readmissions.

Statistical Analysis

We fit multivariable logistic regression models for 30-day unplanned readmission, with the primary predictor of either weekend (Saturday or Sunday) admission or weekend discharge (in separate models). We adjusted for patient age, gender, race/ethnicity, source of admission, insurance, and length of stay. We also adjusted for patient chronic illness complexity using the number of CCCs and technology dependency (yes/no). Variance in all analyses was clustered on individual patients.

RESULTS

We included a total of 55,383 hospitalizations from 32,112 patients (see Supporting Appendix Figure in the online version of this article for cohort derivation). All-cause 30-day readmissions occurred in 14.9% of

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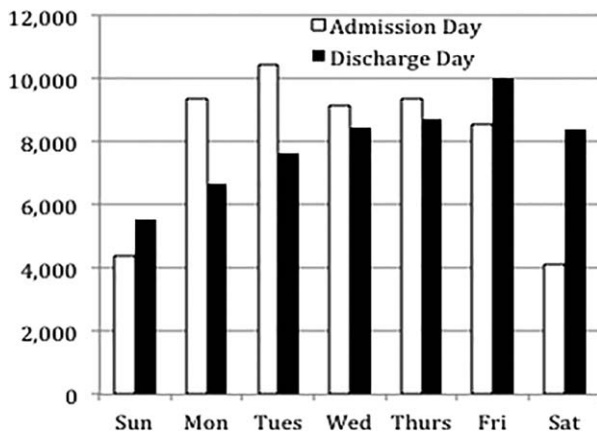


FIG. 1. Day of the week of admission and discharge frequency.

hospital discharges; the 30-day unplanned readmission rate was 10.3% (see the Supporting Appendix Table in the online version of this article for demographic characteristics).

Weekend Admission

Overall, 82% of admissions occurred during the week, with Tuesday as the highest admitting volume day (Figure 1). Children admitted on the weekend had higher odds of unplanned readmission compared to children admitted on weekdays (unadjusted odds ratio [OR] = 1.15 [95% confidence interval {CI}: 1.07-1.24]). Adjusting the analysis for age, gender, race/ethnicity, insurance, length of stay, CCCs, and technology dependency, higher odds of readmission remains significantly higher than weekday admission (adjusted OR = 1.09 [95% CI: 1.004-1.18]) (Table 1). Age, admission source, payer, length of stay, number of complex chronic conditions, and technology dependency were also significantly associated with readmission in the weekend admission model (see the Supporting Appendix Table in the online version of this article). A sensitivity analysis examining the association of weekend admission and readmission within different subpopulations of children with varying numbers of CCCs (ie, among children without CCCs, with 1 CCC, 2 CCCs, and 3+ CCCs) showed that the association remains the same in each subgroup. Further, a sensitivity analysis examining odds of any 30-day readmission was similar to the primary analysis with higher odds of readmission in adjusted analysis (adjusted OR = 1.09 [95% CI: 1.02-1.18]).

Weekend Discharge

Weekend discharges accounted for 34% of all discharges. Fridays had the highest discharge volumes, with lowest discharge volumes on Sunday (Figure 1). Children discharged on the weekend had lower odds of unplanned readmission compared to children discharged on weekdays in bivariate analysis (unadjusted OR = 0.91 [95% CI: 0.85-0.97]). However, when adjusting for important confounders, the relationship was no longer statistically significant (adjusted OR = 0.97 [95% CI: 0.91-1.03]) (Table 1). Age, admission source, payer, length of stay, and number of complex chronic conditions were associated with readmission in the weekend discharge model (see the Supporting Appendix Table in the online version of this article). In a sensitivity analysis examining any 30-day readmission, weekend discharge was not associated with readmission in adjusted analysis.

DISCUSSION

Although the so-called “weekend effect” has been established in adults,¹⁻⁴ evidence is mixed for children. In this sample, where the 30-day pediatric readmission rate is consistent with national pediatric rates,¹⁰ pediatric patients admitted on the weekend have higher odds of readmission compared to children admitted during the week, even when accounting for patient characteristics and hospital length of stay. In contrast, weekend discharge was not associated with readmission.

The association of weekend admission and subsequent readmission is intriguing and may be interpreted in 1 of 2 ways: either patients admitted on the weekend are fundamentally different and thus have higher readmission rates, or care on the weekend is different. It is important to note that we adjusted the analysis for patient characteristics including number of CCCs and technology dependency to account for differences in chronic illness. We also accounted for length of stay as a marker of severity of illness in the hospital. Yet even accounting for these known differences, we cannot discern from these data if the different outcomes for children admitted on the weekend are related to residual population differences (eg, lack of access to primary care or walk-in clinics) or differences in initial clinical management on the weekend.

TABLE 1. Patient Characteristics During Hospitalizations

	30-Day Unplanned Readmission Rate	Unadjusted Odds of Unplanned Readmission (95% CI)	Weekend Admission Model: Adjusted Odds of Unplanned Readmission (95% CI) [†]	Weekend Discharge Model: Adjusted Odds of Unplanned Readmission (95% CI) [†]
Weekend admission, n = 7,533	11.4%, n = 973	1.15 (1.07-1.24)*	1.09 (1.004-1.18)*	—
Weekend discharge, n = 13,911	9.7%, n = 1,344	0.91 (0.85-0.97)*	—	0.97 (0.91-1.04)

NOTE: Abbreviations: CI, confidence interval. * $P < 0.05$. [†]Model adjusted for age category, gender, admission source, race/ethnicity, primary payer type, length of stay, number of complex chronic conditions, and technology dependency.

Initial clinical management on weekend may be different due to differences in physician, nursing, and other ancillary staffing affecting availability of diagnostic and therapeutic interventions. Additionally, smaller staff size on the weekend may lead to increased workload. Although we are unable to directly measure resident workload in our study, prior studies suggest higher workload is associated with worse outcomes for adult patients,¹¹ including readmission.¹² Additionally, nurse staffing, which may vary based on day of week, has been associated with pediatric readmission.¹³

Discharge timing in our population is consistent with prior literature, with Friday being the most common discharge day of week.¹⁴ Prior literature has shown no difference in readmission rates between Friday discharge and midweek discharge for pediatric patients.¹⁴ Our work builds on this existing literature, demonstrating no association with weekend discharge and readmission. There were lower discharge volumes on the weekends, particularly in patients with more CCCs, suggesting that physicians avoid complicated discharges on Saturday and Sunday.

This study should be interpreted in the context of several limitations. First, this study was conducted at a single tertiary care pediatric institution. Our patient population had a high rate of children with CCCs, potentially limiting generalizability to other pediatric institutions. Ideally, we would adjust our model for clusters at the clinical service or attending physician level; however, the heterogeneity of our services and data limits prohibited these analyses. Readmissions that may have occurred at other institutions are not observable in this dataset; however, there is no reason to believe patients admitted or discharged on the weekend would have different rates of other hospital readmissions than patients admitted or discharged on weekdays. Additionally, early readmissions may be particularly affected by in-hospital and discharge factors.¹⁵ However, the very low rate of early readmission prohibited limiting the analyses to early readmission. Finally, we relied on administrative data to adjust for patient severity using typical methods such as CCCs; however, other patient differences may have existed beyond those that could be captured with administrative data.

CONCLUSION

Children admitted to the hospital on the weekend have higher rates of 30-day unplanned readmission

than children admitted during the week, suggesting differences of care in initial management on the weekend. Understanding this difference from the perspectives of multiple stakeholders may illuminate potential reasons for this disparity.

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