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# The Impact of Critically Ill Children on Pediatric Emergency Department Medication Timeliness

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## Abstract

**Objectives—**The presence of critically ill patients may impact care for other emergency department (ED) patients. We sought to evaluate whether the presence of a critically ill child was associated with the time to (1) receipt of the first medication among other patients, and (2) administration of diagnosis-specific medications.

**Methods—**We performed a retrospective cohort study of all pediatric ED visits over three years. Patients were exposed if they arrived during the first hour of a critically ill patient's care. The primary outcome was the time from arrival to first medication administration. Secondary outcomes were time to corticosteroids in asthma and time to antibiotics for fever/neutropenia. We modeled times to medication using median regression, adjusting for demographics, arrival time and weekday, and census (number of patients in the ED).

**Results—**We analyzed 170,112 visits. Median times to first medication for those exposed to 0, 1, and >1 simultaneous critically ill patient were 90 min (interquartile range [IQR] 54,146), and 96 min (IQR 58,157), and 113 (IQR 72,166) respectively ($p<0.001$). The increase in time to corticosteroids among exposed patients versus unexposed was 6 min (IQR 2,14, $p=0.11$) and in time to antibiotic for fever/neutropenia was −4 min (IQR −4,−11, $p=0.13$). Modeled time to first medication increased 3.1 min (95% confidence interval [CI] 0.5,5.7) among all exposed patients ($p=0.02$). Time to first medication increased 15.3 min (95% CI 14.7,15.9) for each 10 patient increase in census.

**Conclusions—**The presence of critically ill patients was associated with a delay in medication administration to others. Census independently predicted medication delays.

### Keywords

Pediatrics; performance measures; length of stay; emergency department

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**CONTRIBUTORSHIP STATEMENT**

Dr. Michelson contributed to study planning, data collection, data analysis, and drafted the manuscript. Drs. Bachur and Levy contributed to study planning, data analysis, and substantially revised the manuscript.

**COMPETING INTEREST STATEMENT**

All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf and declare: KM received grant funding from the AHRQ as stated; no financial relationships with any organizations that might have an interest in the submitted work in the previous three years; no other relationships or activities that could appear to have influenced the submitted work.

## INTRODUCTION

Timeliness and efficiency of emergency department (ED) care depend on the capacity to match patient arrivals to throughput while flexing resources to the immediacy of individual patient needs.[1,2] ED geography, staffing structure, laboratory performance, and pharmacy performance contribute to patient throughput.[3–6] Crowding occurs as a result of a mismatch between patient arrivals and throughput. The negative impacts of crowding include increased mortality, delays and errors in critical therapies and diagnostics, and delays in pain control.[7–12]

Similar to crowding, the presence of critically ill or other resource-intensive patients requires redirection of medical personnel and reallocation of physical resources. Consequently, attention may be drawn from other patients, leading to delays in throughput and care.[13]

We sought to determine whether the presence of a critically ill patient in a pediatric ED is associated with delays in medication delivery for other patients, when compared to timeliness of medication delivery during periods in which there is an absence of critically ill patients.

## METHODS

### Study Design

We performed a retrospective cohort study of all ED visits over a three-year period.

### Data Source

Data were obtained from queries to the electronic medical record database. Arrival and departure timestamps are recorded by an electronic tracking system. Medication timestamps are recorded at the time of administration by barcode scanner or by direct nursing documentation. This study was approved by the local Institutional Review Board.

### Setting and Population

The setting was a 52-bed urban, tertiary-care pediatric ED with approximately 60,000 visits per year and accreditation as a level 1 trauma center. We treat patients under 23 years of age and older patients with chronic pediatric conditions. We evaluate approximately 60,000 children per year, of whom approximately one quarter are sent to a low-acuity “Fast Track” section staffed by general pediatricians. The main ED is staffed with pediatric emergency medicine-certified physicians and approximately 75% of these patients are seen by a pediatric or general emergency medicine resident or a pediatric emergency medicine fellow with attending supervision. Staffing is dynamic; pediatric emergency medicine attendings see a median of 1.4 patients per hour (interquartile range 1.1-1.6). Nursing staffing is typically built around a 1:4 nurse to patient ratio.

We included all patient visits between July 1, 2012 and June 30, 2015. We excluded patients with a length of stay (LOS) longer than 12 hours due to a high frequency of timestamp data errors for these patients. We included critically ill patients (defined below) in the

determination of census and for determining the exposure status of study visits, but they were otherwise excluded from statistical analysis.

We analyzed four groups of patients: (1) all visits; (2) asthma, defined as a primary International Classification of Disease, 9th edition (ICD-9) diagnosis code of 493.00-493.92; (3) gastroenteritis, defined as a primary ICD-9 code of 8.8-9.3, 558.0-558.9, 276.5, 276.6, or 787.91; and (4) fever and neutropenia with malignancy, defined as any patient with a chief complaint listed as "fever" with an absolute neutrophil count less than 500/$mm^3$ and a primary or secondary ICD-9 code of a malignancy (140-209.79).

## Exposure

A patient was considered exposed if he or she arrived during the first hour of the visit of a critically ill patient. We defined critical illness *a priori* as the presence of any of the following: (1) emergency severity index (ESI) of 1, (2) death in the ED, or (3) admission to the ICU after ED intravenous administration of at least one of the following: intravenous vasoactive agents (dopamine, epinephrine, norepinephrine, milrinone, nitroprusside, or labetalol), paralytics (succinylcholine, rocuronium, or vecuronium), osmotic agents (3% sodium chloride or mannitol), or blood products.[14–18]

## Outcomes

The primary outcome for all visits was the time to first medication, defined as the time from patient arrival to first medication administration (excluding acetaminophen or ibuprofen, which may be given in triage by protocol for fever or pain). Secondary outcomes were diagnosis-specific and included time to corticosteroid administration (dexamethasone, methylprednisolone, prednisolone, or prednisone) in asthma; time to ondansetron administration in gastroenteritis, and time to intravenous antibiotic in fever and neutropenia. We also assessed ED LOS, hospital LOS among admitted patients, admission rate, and 72-hour ED revisit rate (defined as a revisit within 72 hours after discharge from an antecedent ED encounter).

## Covariates

We collected patient age, gender, primary language, race, ethnicity, ESI, arrival mode, time of day (categorized as 8am-4pm, 4pm-midnight, and midnight-8am), weekday versus weekend arrival, and the proportion of patients who received a medication. Patients self-reported race and ethnicity at the time of ED registration. Patients who reported more than one race or ethnicity were recorded as "Other." We also collected the ED census at the time of the patient's arrival, defined as the total number of patients in the ED and waiting room. All covariates were ascertained from queries to the electronic medical record database.

## Analysis

We compared demographics, acuity and mode of arrival between exposure groups to assess the similarity of baseline characteristics in each group. To assess our primary outcome, we first performed unadjusted analyses. To assess the impact of critically ill patients on more homogeneous populations, we performed the same comparisons in the diagnosis-specific subgroups.

We also hypothesized that the effect of critically ill patients on time to first medication could be magnified at the time of least staffing (from midnight to 8:00am), at times of higher patient census, or by exposure to multiple critically ill children in the department at the same time. To assess for effect modification, we computed the difference in median and interquartile range (IQR) times to first medication by exposure group stratifying first by time of arrival (overnight hours vs. all other hours), then by quartiles of census. We also compared time to first medication between those exposed to zero, one, or more than one critically ill patient.

We created a median regression model with time to first medication as the dependent variable and included all covariates in the model in order to minimize confounding. We used the same modeling strategies for the diagnosis-specific groups using time to diagnosis-specific medication as the dependent variable.

### Sensitivity Analysis

We performed a separate sensitivity analysis based on the timing of a patient's exposure to a critically ill patient. For this analysis, we determined the median time to first medication among patients who arrived during the following time windows of a critically ill patient's ED course: 0-14 min, 15-29 min, 30-44 min, 45-59 min, 60-119 min, and ≥120 min. We compared each exposure subgroup to an unexposed group of patients who did not arrive at any point of a critically ill patient's course.

We used the Wilcoxon rank-sum test or Kruskal-Wallis test as appropriate for continuous data, the chi square test for categorical data, and the Fisher exact test for categorical data when expected cell counts were under 10. Two-sided p values $< 0.05$ were considered statistically significant. All statistics were calculated using Stata (Stata Statistical Software: Release 13.1, Stata Corp., College Station, TX). Our exposure definition, outcome, and modeling strategy were defined prior to any analysis.

## RESULTS

From July 1, 2012 through June 30, 2015, there were 175,172 ED visits. We excluded from our analysis 3,923 (2.2%) visits for LOS > 12 hours and 1,137 (0.7%) visits that were defined as critical illness encounters. We therefore analyzed 170,112 (97.1%) non-critical visits. Significantly more exposed patients arrived between 4pm and midnight ($p<0.001$), on weekends ($p=0.001$), and when there was a higher census in the ED ($p<0.001$). All other baseline characteristics were similar between exposure groups (table 1).

A medication other than acetaminophen or ibuprofen was given in 84,317 (49.6%) visits. Medication rates were similar between exposure groups ($p=0.29$). (Table 2) Median time to first medication for the unexposed group was 90 minutes and 98 min among all exposed patients ($p<0.001$). LOS was 7 min longer among exposed patients ($p<0.001$). Admission rate, hospital length of stay, and revisit within 72 hours did not differ by exposure. Among patients with asthma, gastroenteritis, and fever with neutropenia, there was no difference in the diagnosis-specific time to medication by exposure.

The increase in median time to first medication among exposed patients arriving outside the overnight shift was 5.0 min (p<0.001) while the increase during the overnight shift was 8.1 min (p=0.001). The difference in median time to first medication between exposure groups among patients by ascending census quartiles was 6.6 min (p=0.01), 4.1 min (p=0.02), 3.8 min (p=0.36), and 6.0 min (p=0.16). Among the entire cohort, 8,124 (4.8%) patients were exposed to 1 critically ill patient, 279 (0.2%) to 2, and 27 (0.0%) to 3. The median time to first medication by number of critically ill patients present was 90 min (IQR 54,146) for zero, 96 min (IQR 58,157) for one and 113 min (IQR 72,166) for more than one critical patient exposure (p<0.001).

The median regression models are shown in table 3. After adjusting for demographics, time of day, day of the week, and census, time to first medication was 3.1 min longer among exposed patients (p=0.02). Adjusting for the same covariates, exposed patients had a total ED LOS 4.6 min (95% CI 1.7,7.5) longer than unexposed patients (p=0.002). Exposure to a critically ill patient was not associated with the time to diagnosis-specific medication in any of the diagnosis-specific models. Census had the strongest association to time to first medication (15.3 minutes per 10-patient increase in census, 95% CI 14.7,15.9). Census had a similar magnitude of association with time to corticosteroid in asthma and time to ondansetron in gastroenteritis (p < 0.001), however it was unassociated with time to antibiotics in fever and neutropenia (p=0.11).

### Sensitivity Analysis

Regardless of how much earlier a critically ill patient arrived prior to each exposed study patient, time to first medication was significantly longer among exposed patients (p < 0.05 for pairwise comparisons between unexposed patients and each of the following timeframes from arrival of critically ill patient to arrival of index patient: 0-14 min, 15-29 min, 30-44 min, 45-59 min, 60-120 min, and >120 min).

## DISCUSSION

The presence of one or more critically ill patients in a pediatric ED was associated with an 8-minute increase in time to first medication, and a 3-minute increase when adjusted for possible confounders. The importance of rapid evaluation and diversion of resources toward treatment of critically ill patients justifies small delays in care for others. This increase, although statistically significant, may not be clinically meaningful for individual patients, but could have a cumulative impact on emergency department efficiency.

We hypothesized that the impact of critically ill patients on the timeliness of medication delivery would be magnified when resources were limited or stressed, such as during overnight shifts with diminished staffing, or during periods of high census. The increase in medication delivery times in the presence of a critically ill patient was only slightly widened during overnight hours and was unchanged by census quartile. Additionally, the presence of critically ill children was not associated with differences in admission rate, revisits, or duration of hospitalization among others in the ED, an absence of association that held true in asthma, gastroenteritis, and fever with neutropenia.

Thus, in this single ED, the stress of a critically ill patient did not substantially impact medication delivery among non-critically ill patients present simultaneously. This finding was contrary to our original hypothesis, but may demonstrate that our ED is resilient to the impact of a single critically ill patient. The results imply that we may have adequate adaptability or flexibility to respond to the demands of a critically ill child.

However, we found that exposure to more than one critically ill patient increased medication delivery time difference to a more clinically significant 17 minutes, which may reflect resource saturation. Repeating this study in other EDs could yield different or conflicting results and would suggest a different pattern of responding to demand. For instance, in single-ED studies, arrival during a trauma activation was associated with an increased risk of 30-day mortality or myocardial infarction, and with a 20-minute increase in LOS among middle-acuity patients.[13,22] However, in a different ED, there was no difference in time to head CT in patients with suspected stroke during trauma activations, perhaps suggesting resilience to system stresses.[23] To understand better how EDs can flex resources to meet unpredictably changing demands, measures and predictors of resilience are needed.

Timeliness and efficiency are core values for quality care delivery.[24] Metrics to measure pediatric emergency care timeliness and efficiency, including census, admission rates, and revisit rates, are important but do not account for a large proportion of the variation in patient outcomes.[25] Disease-specific measures exist in both common and serious illnesses, but disease-specificity necessitates applicability to a limited number of patients.[25,26] Granular timeliness data (such as time to medication delivery) exist in electronic medical records but have not yet been linked to outcomes. Improvements in health and reductions in symptom burden are the most important outcomes to patients yet may be difficult or expensive to ascertain.[27] Thus, performance metrics that are measurable and improvable at the time of the ED visit and predict the outcomes important to patients are needed.

Among all patients, every covariate included in our model except an ESI score of 5 was significantly associated with time to first medication. This may reflect the large sample size or alternatively suggest there are numerous influences on medication delivery. Regardless, their inclusion in the model is intended to adjust for confounding between exposure and outcome. The strongest driver of time to medication in our cohort was census, with a 1.5-minute increase for each additional patient in the ED. Census has previously been shown to be a good marker for crowding.[28] Our results are congruous with previous work linking crowding and system stresses to delays in treatment.[2,13] While not the primary outcome, our study provides further evidence that patient throughput is important because it is tied closely to outcomes.

This study had several limitations. First, the time to medication outcome could only be applied to the those who received a medication, which was half of ED visits in our study; this would therefore not be a relevant outcome for many exposed patients. Although time to medication is not a validated measure, it represents the initiation of treatment, in line with treatment guidelines and patients' preferences for early initiation of therapy.[29] Our primary outcome may also not be the relevant measure in some diseases in which the time to the key medication for that disease should be the focus. Second, our definition of critical

illness was not based on previous literature. There is no clear consensus definition for critical illness on which we could rely, and thus we chose to limit our definition to a highly resource-intensive subset of patients in an effort to assess the maximum impact of this special category of patients. Third, time to first medication was used as representation of medication delivery, which could be impacted by waiting room time, evaluation time, pharmacy time, and the time for nurse or physician administration. However, we intentionally selected a measure that would rely on efficiency at all steps of the process, as we hypothesized that critically ill patients might adversely disrupt any stage of patient care from the moment of arrival to ultimate disposition. Finally, the results of this study depended on the processes of our single center and may be substantially different depending on staffing, volume, structure, and processes in other settings.

### Conclusions

In a large, academic pediatric ED, critically ill patients were associated with delays in medication administration to other patients. Multiple simultaneous critical patients were associated with longer medication delays than a single critical patient. Census was strongly associated with medication delays.

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**What is already known on this subject**

Emergency department crowding causes delays in care and treatment. In the adult setting, system stresses such as poor staffing and trauma activations have been shown to degrade emergency department performance on key quality indicators such as outcomes in acute coronary syndromes. Similar studies have not been performed in pediatric EDs.

### What this paper adds

In this retrospective study of three years of visits at a pediatric ED in the US, the presence of a critically ill child had a statistically but not clinically significant on time to medication for other patients in the department. However, as the number of critically ill children in the department increased, medication delays were longer. This paper shows that stresses other than crowding and low staffing impact emergency department performance.

## TABLE 1

Demographic characteristics by exposure status.

| | Unexposed N=161,682 (95.0%) n (%) | Exposed N=8,430 (5.0%) n (%) | p |
|---|---|---|---|
| Age, median (IQR) | 5.9 (2.0,12.9) | 5.9 (2.0,12.6) | .93 |
| Male gender | 85,374 (53) | 4,446 (53) | .90 |
| Primary language | | | .80 |
| English | 126,469 (81) | 6,588 (81) | |
| Other | 29,022 (19) | 1,523 (19) | |
| Race | | | .72 |
| White | 62,040 (41) | 3,256 (41) | |
| Black | 30,551 (20) | 1,595 (20) | |
| Asian | 5,493 (4) | 301 (4) | |
| Other | 53,220 (35) | 2,736 (35) | |
| Ethnicity | | | .97 |
| Non-Hispanic | 103,441 (71) | 5,415 (71) | |
| Hispanic | 42,738 (29) | 2,235 (29) | |
| ESI | | | .83 |
| 2 | 25,798 (16) | 1,385 (17) | |
| 3 | 81,740 (51) | 4,270 (51) | |
| 4 | 46,429 (29) | 2,420 (29) | |
| 5 | 5,377 (3) | 281 (3) | |
| Arrival mode | | | .42 |
| Walk-in | 137,771 (87) | 7,279 (88) | |
| Ambulance | 10,463 (7) | 524 (6) | |
| Air | 150 (0) | 6 (0) | |
| Transfer | 9,156 (6) | 456 (6) | |
| Arrival hour | | | <.001 |
| 8am-4pm | 63,379 (39) | 3,225 (38) | |
| 4pm-12am | 78,281 (48) | 4,620 (55) | |
| 12am-8am | 20,022 (12) | 585 (7) | |
| Arrival day | | | .001 |
| Weekday | 113,124 (70) | 5,756 (68) | |
| Weekend | 48,558 (30) | 2,674 (32) | |
| Census, median (IQR) | 29 (19,38) | 32 (23,40) | <.001 |

Numbers do not add to 100% due to missing data

## TABLE 2

Univariate associations between exposure and outcomes among all patients and those with asthma, gastroenteritis, and fever and neutropenia with malignancy.

| | Unexposed | Exposed | p |
|---|---|---|---|
| **All patients** | | | |
| N (%) | 161,682 (95) | 8,430 (5) | |
| Received any medication (%) | 80,186 (50) | 4,131 (49) | .29 |
| Time to first medication (min) | 90 (54,146) | 98 (58,157) | <.001 |
| ED length of stay (min) | 188 (116,284) | 195 (124,286) | <.001 |
| Hospital length of stay (days) | 2.0 (1.1,3.7) | 2.0 (1.1,3.8) | .74 |
| Admitted (%) * | 30,146 (19) | 1,514 (18) | .07 |
| Revisit within 72 hours (%) | 5,081 (4) | 272 (4) | .77 |
| **Asthma** | | | |
| N (%) | 4,965 (95) | 271 (5) | |
| Received corticosteroid (%) | 3,472 (70) | 195 (72) | .48 |
| Time to corticosteroid (min) | 69 (48,105) | 75 (50,119) | .11 |
| ED length of stay (min) | 238 (167,312) | 245 (186,297) | .61 |
| Hospital length of stay (days) | 1.6 (1.1,2.2) | 1.7 (1.1,2.1) | .76 |
| Admitted (%) * | 1,432 (29) | 64 (24) | .05 |
| Revisit within 72 hours (%) | 175 (5) | 13 (6) | .40 |
| **Gastroenteritis** | | | |
| N (%) | 6,475 (96) | 298 (4) | |
| Received ondansetron (%) | 3,523 (54) | 162 (54) | .99 |
| Time to ondansetron (min) | 79 (53,117) | 86 (57,132) | .33 |
| ED length of stay (min) | 205 (137,299) | 219 (143,313) | .05 |
| Hospital length of stay (days) | 2.1 (1.2,3.9) | 2.3 (1.2,6.1) | .31 |
| Admitted (%) * | 979 (15) | 51 (17) | .39 |
| Revisit within 72 hours (%) | 291 (5) | 18 (7) | .18 |
| **Fever and neutropenia** | | | |
| N (%) | 201 (94) | 13 (6) | |
| Received antibiotic (%) ** | 191 (95) | 13 (100) | 1 |
| Time to antibiotic (min) | 54 (42,67) | 50 (38,56) | .13 |
| ED length of stay (min) | 216 (172,260) | 224 (178,238) | .94 |
| Hospital length of stay (days) | 3.8 (2.6,5.9) | 2.7 (2.0,3.2) | .04 |
| Admitted (%) *,** | 197 (99) | 13 (100) | 1 |
| Revisit within 72 hours (%) | 0 (0) | *** | |

* Disposition unknown in some patients

** Fisher exact test used due to low expected cell counts

*** No patients discharged in the exposed group from which to calculate a revisit rate

## TABLE 3

Multivariate median regression models predicting time to medication.

| Sample | All visits | | Asthma | | Gastroenteritis | | Fever and neutropenia | |
|---|---|---|---|---|---|---|---|---|
| Outcome variable | Time to first medication | | Time to corticosteroids | | Time to ondansetron | | Time to antibiotic | |
| | Coef (95% CI) | p | Coef (95% CI) | p | Coef (95% CI) | p | Coef (95% CI) | p |
| Exposed | 3.1 (0.5,5.7) | .02 | 6 (−2,13) | .13 | −4 (−12,4) | .35 | −5 (−20,10) | .54 |
| Age | 0.21 (0.12,0.30) | <.001 | −0.45 (−0.76,−0.15) | .003 | −0.41 (−0.72,−0.10) | .01 | 0.47 (−0.20,1.15) | .16 |
| Male gender | −6.1 (−7.3,−5.0) | <.001 | −2.4 (−5.7,0.9) | .16 | −1.3 (−4.8,2.1) | .45 | −2.1 (−9.4,5.3) | .58 |
| Primary language | | | | | | | | |
| English | Referent | | Referent | | Referent | | Referent | |
| Other | 5.5 (3.8,7.2) | <.001 | 1.0 (−3.6,5.6) | .67 | 2.3 (−2.1,6.6) | .31 | 10 (0,21) | .05 |
| Race | | | | | | | | |
| White | Referent | | Referent | | Referent | | Referent | |
| Black | −11 (−13,−9) | <.001 | −8 (−13,−4) | <.001 | 0.5 (−4.9,5.8) | .86 | 1 (−22,25) | .92 |
| Asian | −3.2 (−6.4,0) | .05 | 0 (−10,11) | .96 | −7 (−17,4) | .20 | −6 (−20,8) | .37 |
| Other | −3.6 (−5.5,−1.8) | <.001 | −0.5 (−6.2,5.2) | .86 | 3.1 (−2.5,8.7) | .28 | −2 (−15,10) | .71 |
| Ethnicity | | | | | | | | |
| Non-Hispanic | Referent | | Referent | | Referent | | Referent | |
| Hispanic | −4.1 (−5.9,−2.2) | <.001 | 0.5 (−4.4,5.3) | .85 | −4.6 (−9.6,0.5) | .08 | −13 (−26,0) | .05 |
| ESI | | | | | | | | |
| 2 | Referent | | Referent | | Referent | | Referent | |
| 3 | 30 (29,32) | <.001 | 16 (12,20) | <.001 | 10 (3,17) | .004 | 1 (−18,20) | .92 |
| 4 | 3.2 (1.3,5.1) | <.001 | 20 (15, 25) | <.001 | −20 (−27,−12) | <.001 | * | |
| 5 | −0.2 (−5.0,4.5) | .92 | 7 (−23,38) | .63 | −26 (−41,−11) | .001 | * | |
| Arrival mode | | | | | | | | |
| Walk-in | Referent | | Referent | | Referent | | Referent | |
| Ambulance | −18 (−20,−16) | <.001 | −7 (−13,−2) | .007 | −5 (−14,5) | .35 | 10 (−13,32) | .41 |
| Air | −35 (−52,−18) | .003 | 124 (33,216) | .007 | * | | * | |
| Transfer | −7.6 (−9.9,−5.2) | <.001 | 6 (−5,17) | .32 | 22 (5,39) | .01 | 119 (86,152) | <.001 |
| Arrival hour | | | | | | | | |
| 8am-4pm | Referent | | Referent | | Referent | | Referent | |
| 4pm-12am | −15 (−17,−14) | <.001 | −11 (−16,−7) | <.001 | −20 (−24,−15) | <.001 | −2 (−14,10) | .74 |
| 12am-8am | −3.8 (−5.7,−2.0) | <.001 | 2.3 (−2.3,6.9) | .32 | 1.8 (−3.3,6.8) | .50 | −1 (−15,13) | .89 |
| Arrival day | | | | | | | | |
| Weekday | Referent | | Referent | | Referent | | Referent | |
| Weekend | −4.7 (−6.0,−3.5) | <.001 | −1.8 (−5.2,1.7) | .31 | −1.4 (−5.2,2.3) | .45 | 0.7 (−8.0,9.4) | .88 |
| Census | 1.53 (1.47,1.59) | <.001 | 1.30 (1.14,1.46) | <.001 | 1.80 (1.64,1.97) | <.001 | 0.24 (−0.12,0.60) | .19 |

*No patients had this attribute