ED Patient Experience: Does Day of the Week or Time of the Day Matter?

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Abstract
The effect of the arrival day of the week, arrival time of the day, or discharge time of the day on emergency department (ED) patient experience (PE) scores has not been well studied. We performed a retrospective analysis of ED patients between July 1st, 2018 through March 31st, 2021. We recorded demographics, PE scores, arrival day, arrival and discharge times, and total ED and perceived ED times. We performed univariate and multivariable analyses. We sent 49,849 surveys and received back 2423 that we included in our study. The responding patients' median age was 52, with a majority of female gender (62%) and white race (57%). The average arrival time was 1:40 PM, and the average discharge time 2:38 PM. The average total ED time was 261 minutes, while the average perceived ED time was 540 minutes. We found a statistical association between worse PE scores and longer actual ED time but not longer perceived time. A later arrival time was significantly associated with worse PE scores on 4 out of 6 domains of the PE questionnaire. The discharge time and the day of the week were not significantly associated with PE scores. Conclusion: Actual longer ED time was significantly associated with worse PE scores, but not perceived time. Later arrival time was associated with worse PE scores, but not later discharge time. The arrival day of the week was not statistically associated with differences in PE. Further studies are needed to confirm these findings.

Keywords
Patient experience, emergency department, patient satisfaction, ED arrival time, ED discharge time, ED arrival day of the week, perceived ED time

Introduction
Patient experience (PE) encompasses the range of interactions patients have with the health care system. Understanding PE is a crucial step in moving toward patient-centered care. Medical literature and clinical practice often interchange the terms patient satisfaction and PE. This paper will only use the term PE (1).

In 2012, the Centers for Medicare and Medicaid Services (CMS) launched an initiative to develop a reliable, valid, standardized survey to measure patients’ experience of ED care. The ED Consumer Assessment of Healthcare Providers and Systems (CAHPS) Survey targets hospital-based ED adult patients (18 and older) discharged home. The ED CAHPS Survey includes key demographic items and 35 questions on communication and care coordination (2).

The analyzed PE scores pertain to six domains (see Appendix for a sample of the form): the Arrival Domain, the Nursing domain, the Provider Domain, the Testing Domain, the Personal Domain, and the Overall Domain.

Little is known about the potential effect of the arrival day of the week, the arrival time of the day, and the discharge time of the day on these scores. This paper looks at whether the PE scores vary depending on what day or time an ED patient arrives or gets discharged.

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Methods

We conducted a retrospective analysis of patients who presented to Cooper University Hospital’s ED from July 1st, 2018, through March 31st, 2021. Our institution is a 635-bed urban academic tertiary level 1 trauma care center in Southern New Jersey with a typical annual ED census of around 80,000 visits. The Cooper University Healthcare Institution Review Board approved the study (IRB# 21-091).

Demographic Variables

We collected the following variables: age, gender, race, arrival method, acuity level, insurance status, arrival time, discharge time, arrival day of the week, total ED time, and perceived ED time.

Patient Experience Questionnaires

Our institution uses Press Ganey to assist in collecting data for PE. We dichotomized the overall domain scores into optimal (100%) or sub-optimal (any other value). The ED total time is between arrival and discharge from the ED. The ED perceived time is a value that the respondents of the ED CAHPS survey fill out.

Statistical Analysis

We presented the categorical variables as percentages and the continuous variables as mean and standard deviation. We performed Chi-squared analysis, T test, Fleiss Kappa calculation, Spearman correlation, and multivariable regression analysis. For the latter, we entered the variables: age, gender, race, insurance status, acuity score, arrival method, arrival day of the week, arrival time, discharge time, total ED time, and perceived time. We used a forward conditional methodology and considered variables to have a significant association with the outcomes of interest if \( p < 0.05 \). All analyses utilized SPSS, IBM 28.0 software, Chicago, IL, USA.

Results

Demographics and Encounter Times

Over the study period, we sent surveys to 49,849 adult patients discharged from ED; 19,688 were paper, and 30,161 were electronic surveys. We received 2,423 completed surveys putting the response rate at 4.9%. Forty-three percent of the surveys were completed after March 2020, the start of the COVID-19 pandemic. We present the demographic data in Table 1, showing a median age of 52 [31–65]. The majority of the patients were female (62%), of the white race (57%), and had managed care for type insurance (58%). The mean arrival time was 1:40 PM, and the mean discharge time was 2:38 PM. The mean total ED time was 261 minutes, while the mean ED perceived time was 540 minutes, and there was a significant difference between the ED total time and perceived time \( p < 0.001 \). There was minimal day-to-day or weekday-to-weekend variation in the number of patients responding to the survey.

Responses to Patient Experience Questionnaires

We present the responses in Table 2. The Fleiss Kappa was 0.227 for the ED discharged cohort indicating a fair agreement between the responses.

Encounter Times by Experience Outcome

We compared the arrival, discharge, total, and perceived times and stratified the cohorts between the patients whose experience was optimal (score 100%) and sub-optimal (less than 100%). There was a significant association between sub-optimal PE scores and longer ED total time (in all six domains of the ED CAHPS Survey) and between sub-optimal PE scores and later
ED arrival time (in four out of six domains of the ED CAHPS Survey). We did not find such association with the ED perceived time, the arrival day of the week, or the discharge time of the day. Table 3 summarizes our findings.

**Multivariable Analysis**

We performed a multivariable regression analysis as described in the methods section. For all the outcomes, the ED total time but not the perceived time or the discharge time was independently associated with worse PE scores. Later arrival time was associated with a worse score for four out of the six survey domains, including the overall domain. Odds ratios for the regression analysis are presented in Table 4.

**Discussion**

This study examined the influence of the arrival time of the day, the discharge time of the day, and the arrival day of the week on ED PE scores. The scores were worse with later arrival in the day and with longer ED stays. But the arrival day of the week, the discharge time of the day, and the perceived ED time did not affect the scores.

First, patients with unfavorable ED PE scores spent more time in the ED than patients with favorable ones. This finding aligns with the current evidence that longer ED stays

| Table 2. Responses to Questionnaires. |
|--------------------------------------|
|                                       |
| Mean   | Top box |                                      |
| Arrival domain | 77.6 (23.4) | 650 (26.9%) |
| Nursling domain | 83.9 (24.5) | 1308 (54.1%) |
| Provider domain | 83.2 (26.1) | 1370 (56.9%) |
| Testing domain | 74.6 (31.6) | 822 (38.3%) |
| Personal domain | 75.2 (29) | 898 (37.4%) |
| Overall assessment domain | 77.7 (31.3) | 1288 (53.5%) |

| Table 3. ED Times and PE Scores. |
|-----------------------------------|
|                                      |
|                                      |
| Arrival time (h) | Discharge time (h) | ED time (min) | ED perceived time |
|------------------|-------------------|---------------|-------------------|
| Arrival domain   | 14.2 (5.2)*      | 14.4 (8.4)    | 275 (160)**       | 652 (10,592) |
| 100%             | 14.9 (7.7)       | 224 (135)     | 239 (229)         |
| Nursing domain   | 14 (5.2)         | 14.4 (8.3)    | 287 (169)**       | 863 (13,337) |
| 100%             | 14.6 (7.8)       | 240 (138)     | 266 (462)         |
| Provider domain  | 14 (5.3)         | 14.2 (8.5)    | 281 (162)**       | 901 (13,817) |
| 100%             | 14.9 (7.7)       | 246 (147)     | 270 (457)         |
| Testing domain   | 14.1 (5)****     | 14.6 (8.1)    | 288 (163)**       | 784 (12,258) |
| 100%             | 14.9 (8.3)       | 254 (141)     | 265 (212)         |
| Personal domain  | 14.1 (5.1)**     | 14.6 (7.9)    | 281 (167)**       | 712 (11,489) |
| 100%             | 14.6 (8.3)       | 231 (127)     | 262 (541)         |
| Overall assessment domain | 14.2 (5.2)*** | 14.9 (7.7) | 284 (169)** | 453 (2779) |
| 100%             | 13.6 (5.2)       | 242 (138)     | 614 (12,084)      |

*0.032.
***<0.001.
**** 0.001.
***** 0.006.
****** 0.021.

| Table 4. Multivariable Analysis. |
|-----------------------------------|
|                                      |
|                                      |
| Arrival time | Discharge time | ED time | Perceived time |
|-------------|----------------|---------|----------------|
| Overall     | 1.8 [1.2–2.6]** | NS | 1.01 [1.01–1.01]** | NS |
| Nursing domain | NS | NS | 1.01 [1.01–1.01]** | NS |
| Provider domain | NS | NS | 1.01 [1.01–1.01]** | NS |
| Personal domain | 1.9 [1.2–2.8]*** | NS | 1.01 [1.01–1.01]** | NS |
| Arrival domain | 1.7 [1.1–2.6]***** | NS | 1.01 [1.01–1.01]** | NS |
| Testing domain | 1.6 [1.01–2.4]**** | NS | 1.01 [1.01–1.01]** | NS |

*0.004
****<0.001
****<0.003
******<0.019
*******<0.039
NS (not significant).
Age, Gender, Race.
Acuity.
Arrival method.
Insurance.
Day of week.
correlate with worse PE scores (3), including recently published data from this study’s ED (4). Note that our study ED is a very high volume one with longer than national and state average total ED time (5).

Second, the association between poor scores and high ED times did not persist when using the patients’ perceived ED time. This finding is counterintuitive; one would expect patients to be less satisfied when they feel they have stayed long. Our result is also at odds with previously published studies (6, 7) showing a correlation between long perceived times and poor scores. One potential explanation is that some patients might have expected to stay longer than their perceived times. Sicker patients might expect to stay longer in the ED, and their acuity and complexity of medical issues could have altered their time perception. Similarly, patients with long perceived time might have felt that the ED team made an effort to communicate delays leading to a positive ‘waiting experience’ (8). Frequent updates to patients in regards to wait times and care plans can have a positive impact on PE even when waits are very long.

Third, patients arriving later in the day had a less favorable experience. A Press Ganey report (9) from 1893 hospitals in 2009 showed better PE scores in patients arriving between 7 AM and 3 PM compared to patients arriving later. The association between poor PE and later arrival to the ED is, otherwise, not well studied. In our study, most patients arrived at the ED between the late morning and mid-afternoon, with the mean arrival time being around 1 PM for patients with favorable scores and 2 PM for those with unfavorable ones. Therefore, it is likely that patients arriving later in the day had worse PE scores because the ED was crowded and at capacity. The saturation of the ED increased their ED total time and might have delayed their evaluation and treatment. A potential solution is to improve staffing and throughput measures to decrease the afternoon crowding peak. Staffing optimization is challenging in practice. Shortage of clinical frontline staff in the ED, radiology, laboratory, to name a few, is a daily occurrence that worsened in the post-pandemic part of this study. For example, the US Bureau of Labor Statistics projects that more than 275,000 additional nurses are needed from 2020 to 2030 and that employment opportunities for nurses are projected to grow at a faster rate (9%) than all other occupations from 2016 through 2026 (10).

Fourth, our study did not find an association between ED PE and the arrival day of the week. One would expect worse scores in patients arriving on Monday or Tuesday when the ED is the busiest—the volume on the weekend is around 83% of the Monday and Tuesday volume. The 2010 Press Ganey report (9) had indeed shown better PE scores on the weekend. In our review of the literature, we did not find other studies looking at this association.

Limitations

The absolute PE scores are often high, as in this study, and hospitals constantly try to reach the optimal score to stay competitive. Hence, our choice to separate PE scores into two categories that clump all sub-optimal scores into one. But one possible limitation is that we put the slightly dissatisfied and very dissatisfied patients in one bucket.

The study data collection started in 2018, before the COVID-19 pandemic, and continued until March 2021. At the pandemic’s beginning, ED volumes sharply dropped. This study’s ED mirrored the national trend with a 20% volume decrease in 2020 compared to 2019. The actual ED times decreased and throughput improved. The acuity of cases increased by 2% and the patients’ average length of stay decreased by 9%. But the effect of the pandemic on PE scores is unclear. There is published data suggesting improved PE scores (11), as patients expressed ‘leniency’, ‘gratitude’ (12), ‘understanding’, and ‘appreciation’ (13). Qualitative research has, on the other hand, identified themes that could negatively affect the PE scores (14): concerns regarding exposure, infection, the impact of COVID-19 on care, and challenges when communicating with emergency health care workers wearing personal protective equipment. Note that the hospital of our study had a strict visitation restriction policy, banning family or friends from the ED and waiting room. We chose not to end the study with the start of the pandemic in order to get a larger sample.

While not particular to our study, the low response rate is a significant limitation—less than 5% of discharged patients returned their survey. The respondents might have had an extremely positive or negative experience. A recent study of our institution’s ambulatory care locations found a higher rate of non-respondents among patients with low socioeconomic status (15). More studies to confirm our findings are therefore necessary.

Conclusion

The ED PE was worse with longer ED stays and later ED arrival but was not affected by the ED arrival day of the week or the time of discharge from the ED.

Ethics and Consent Statement

This research project was approved by the Cooper University Healthcare Institution Review Board (IRB #21-091). Patient’s consent was waived.

Declaration of Conflicting Interests

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Supplemental Material

Supplemental material for this article is available online.
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