Emergency Department Overcrowding Lowers Patient Satisfaction Scores

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Crowding in emergency departments (EDs) is a concern for hospital administrators, emergency providers, and patients. Many factors contribute to crowding, including variable patient volume and acuity along with contributing hospital factors such as inadequate nursing support and insufficient inpatient beds resulting in prolonged ED boarding times.[1] To better study and define characteristics indicative of crowding, the National Emergency Department Overcrowding Study (NEDOCS) established a standardized and validated scoring system to quantify crowding in an academic setting.[2] Although individual components attributed to crowding and patient satisfaction have been studied,[3–5] including studies utilizing the NEDOCS score in relation to patient satisfaction,[6] none to our knowledge have investigated the Press Ganey Associates, Inc (PGA) surveys and NEDOCS scores.

The use of patient satisfaction scores for evaluating physician performance and subsequent reimbursement is common. Determining the impact of variables beyond the ED physicians control such as inpatient boarding and severe ED crowding is extremely important as these factors may have negative impacts on perceived quality of care and incentive programs.[7] This study examines the association of the NEDOCS score with PGA patient satisfaction survey scores. We conducted a cross-sectional study of adult patients (≥18 years) treated in a 60,000-visit Midwestern, academic, tertiary referral ED between January 1, 2017, and October 31, 2018. Patients who were discharged home from the ED were mailed a self-administered PGA ED satisfaction survey by two-stage mail, via e-mail and postal mail. Patient-level administrative data were linked deterministically to patient satisfaction scores. This study was deemed not human subjects research by the institutional review board.

The primary exposure in this study was the NEDOCS score, measured by our hospital electronic medical record system every 15 minutes. As previously described, this measure is built from a linear regression model and estimates the degree of crowding using several operational variables.[2] The final single measure score is categorized as normal (0–50), busy (51–100), overcrowded (101–140), severe (141–180), and disaster (>180). As with previous studies, we used a pragmatic approach of further categorizing NEDOCS into three levels of crowding scores: not crowded (0–100), crowded (101–140), or severely crowded (≥141).[6] The arrival time of the patient documented in the administrative data was linked to the NEDOCS score during the corresponding time interval. Other covariates included ESI acuity level categorized as urgent (immediate, urgent, emergent) and nonurgent (less urgent, nonurgent)[8], arrival method of walk-in (walk-in, private vehicle) and other (air, ambulance, police, other), and arrival shift (0800–1559, 1600–2359, 0000–0759). Patient-level demographics available included age, which was assessed continuously.

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The outcome of interest was the PGA ED satisfaction score reported by the patient across several domains, including 1) courtesy of the doctor (courtesy), 2) degree to which the doctor took the time to listen to you (listen), 3) doctor's concern for your comfort while treating you (comfort), 4) doctor's concern to keep you informed about your treatment (informed), 5) likelihood of your recommending our emergency department to others (recommend), and 6) waiting time before you were brought to the treatment area (wait). Each domain response as measured by the PGA patient satisfaction survey ranged from ratings of 0, 25, 50, 75, and 100. We then dichotomized the ratings at/above the 10th percentile, which was consistent across all domains as a low score (0–50) or a high score (75–100). The relationship between each exposure and outcome was evaluated using Pearson's chi-square for categorical variables and logistic regression for continuous variables. We evaluated the bivariate relationship between NEDOCS score on patients documenting a low PGA satisfaction score for each domain through logistic regression. We included patient characteristics (such as age, acuity, and mode of arrival) and NEDOCS score in our multivariable models. Due to multiple comparisons and similarity across the six domains, we used an $\alpha = 0.008$ ($\alpha = 0.05/6$ domains) to identify confidence intervals. We additionally calculated E-values in sensitivity analyses of both outcomes to assess the potential effect of unmeasured confounders.[9]

There were 2,344 PGA patient satisfaction surveys returned, corresponding with an overall survey response rate of 10%. The median age of patients was 54 years (IQR = 33–67 years). The majority of patients were walk-ins (83.6%) and classified as urgent (82.8%). By time of day, 48.1% of patients presented between 0800 and 1359, 36.9% presented between 1600 and 2359, and 15.0% presented between 0000 and 0759. For the distribution of NEDOCS scores, 38.6% of patients were seen when there was no crowding, 32.3% were seen when there was crowding, and 29.1% of patients were seen when there was severe crowding. The following includes the percentage of patients who reported low scores within each domain: courtesy (12.9%), listen (18.2%), comfort (19.9%), informed (21.2%), recommend (29.0%), and wait (36.4%).

Age was associated with each patient satisfaction domain. For example, the unadjusted odds ratio of a 1-year increase in age on a low comfort score was 0.98 (95% CI = 0.97 to 0.99), while the odds of a poor comfort score for a patient with a nonurgent acuity level was 1.38 (95% CI = 1.02 to 1.85) times that of a patient with an urgent acuity level.

In the final adjusted models, courtesy and listen scores were not associated with a low NEDOCS scores (Table 1). There was an increase in the odds of reporting low scores for comfort and informed two domains comparing patients who were seen in the severely crowded ED compared to the not crowded ED. The odds of a low score for recommend and patient self-reported wait time increased as the NEDOCS crowding score increased.

Over 2,000 PGA patient satisfaction surveys were compared to NEDOCS scores in this study. Six aspects of their survey results were focused on including physician-based factors such as courtesy, taking the time to listen, comfort, keeping the patient informed, and institution-based factors of likelihood of recommending the ED to others and wait time. It was noted that highest NEDOCS scores were associated with lower PGA ED scores in feeling comforted and informed of care as well as wait times and likelihood to recommend. Most notably, as crowding increased, the odds of reporting a low score for recommendation of this ED to others increased. These results suggest a notable association between increased ED crowding and decreased patient satisfaction, especially with system-level satisfaction (likelihood to recommend) compared to smaller correlations made to specific individual-level (physician-based) factors. This becomes critical as individual ED physician and administrator compensation incentive plans are tied to satisfaction results.[10] Emergency medicine physicians should not be penalized for low patient satisfaction during times of high ED crowding especially if the satisfaction measures most affected are uncontrollable by individual ED physicians, but satisfaction with the provider is only mildly to moderately affected in comparison. These results are consistent with a previous study showing higher ED crowding scores to have negative effects on patient satisfaction scores and hallway use and long periods of boarding being associated with decreased likelihood to recommend.[4] Other studies also had consistent results with ours showing higher ED crowding to be associated with decreased patient satisfaction.[3,6]

We acknowledge that there are several limitations to our study. First, this was limited to a single site in the Midwest, and patient satisfaction may differ in other regions limiting the generalizability of results; however,

Table 1
Relationship Between NEDOCS and Patient Satisfaction Domain

Patient Satisfaction Domain	uOR	95% CI	aOR*	95%CI	E-Value†
Courtesy of the doctor					
Crowded vs. not crowded	1.29	0.87–1.92	1.29	0.87–1.93	1.90
Severely crowded vs. not crowded	1.35	0.90–2.02	1.33	0.88–1.99	1.99
Degree to which the doctor took the time to listen to you					
Crowded vs. not crowded	1.22	0.86–1.72	1.22	0.86–1.73	1.73
Severely crowded vs. not crowded	1.36	0.96–1.93	1.35	0.95–1.92	2.04
Doctor's concern for your comfort while treating you					
Crowded vs. not crowded	1.26	0.90–1.76	1.26	0.90–1.77	1.83
Severely crowded vs. not crowded	1.47	1.05–2.06	1.46	1.04–2.04	2.28
Doctor's concern to keep you informed about your treatment					
Crowded vs. not crowded	1.34	0.97–1.86	1.35	0.97–1.87	2.04
Severely crowded vs not crowded	1.49	1.07–2.07	1.47	1.05–2.05	2.30
Likelihood of your recommending our ED to others					
Crowded vs. not crowded	1.35	1.00–1.83	1.37	1.01–1.85	2.08
Severely crowded vs. not crowded	2.34	1.74–3.14	2.37	1.75–3.19	4.17
Waiting time before you were brought to the treatment area					
Crowded vs. not crowded	2.29	1.70–3.08	2.39	1.77–3.23	4.21
Severely crowded vs. not crowded	5.13	3.80–6.92	5.47	4.03–7.44	10.41

NEDOCS = National Emergency Department Overcrowding Study; aOR = adjusted odds ratio; uOR = unadjusted odds ratio.
*Adjusted for age, ESI acuity level, and mode of arrival.
†To address the potential for unmeasured confounding, we have also included the e-value as a sensitivity analysis. This estimate is the minimum strength of association that an unmeasured confounder would need to have with both the exposure and the outcome, conditional on the measured covariates, to fully explain away a specific exposure-outcome association.

the extent to which these trends may still exist in other regions may be further explored in future studies. Only those patients who were discharged from the ED received PGA patient satisfaction surveys, per hospital protocol, including those brought into the ED involuntarily by police, EMS, or family. These may potentially bias our results due to the varying circumstances or situations with which patients present. However, this also suggests that despite our patient sample not directly experiencing boarding since they were all discharged, they were also negatively impacted. We additionally had a low response rate, because only 10% of patients eligible to receive PGA patient satisfaction surveys responded. This also could indicate a response bias in that those who did respond are on the extremes of the spectrum for their satisfaction scoring. While only a few covariates were accounted for in this study, evaluation of the E-value also allows us to assess the extent of unmeasured confounding that might have resulted in null findings. As Table 1 indicates, several outcome measures would have required significant confounding to explain away the associations observed. Finally, despite NEDOCS being a validated measure for ED crowding, it is impossible for the score to reflect all variables that may impact the patient experience. NEDOCS is intended to reflect the provider opinion of crowding in the department, and this may not reflect the patient perception of crowding. Additionally, every ED is unique in how it approaches operational decisions and metrics; this may impact the usefulness of estimating the impact of NEDOCS on patient satisfaction across multiple sites.

In conclusion, ED crowding primarily decreases system-level satisfaction scores and affects not only patients who are admitted and boarding but also discharged patients. Therefore, hospital administrators interested in improving PGA patient satisfaction scores should focus on improving ED throughput and reducing inpatient boarding.

References

1. Moskop JC, Sklar DP, Geiderman JM, Schears RM, Bookman KJ. Emergency department crowding, part 1–concept, causes, and moral consequences. Ann Emerg Med 2009;53:605–11.
2. Weiss SJ, Derlet R, Arndahl J, et al. Estimating the degree of emergency department overcrowding in academic medical centers: results of the National ED Overcrowding Study (NEDOCS). Acad Emerg Med 2004;11:38–50.

3. Tekwani KL, Kerem Y, Mistry CD, Sayger BM, Kulstad EB. Emergency department crowding is associated with reduced satisfaction scores in patients discharged from the emergency department. West J Emerg Med 2013;14:11–5.
4. Pines JM, Iyer S, Disbot M, Hollander JE, Shofer FS, Datner EM. The effect of emergency department crowding on patient satisfaction for admitted patients. Acad Emerg Med 2008;15:825–31.
5. Rabin E, Fernandez G, Mun S, Mathews K. 121 The association of hospital crowding with general and physician-specific customer service scores. Ann Emerg Med 2019;74:S49–S50.
6. Wang H, Kline JA, Jackson BE, et al. The role of patient perception of crowding in the determination of real-time patient satisfaction at emergency department. Int J Qual Health Care 2017;29:722–7.
7. Boudreaux ED, O'Hea EL. Patient satisfaction in the emergency department: a review of the literature and implications for practice. J Emerg Med 2004;26:13–26.
8. Emergency Severity Index (ESI): A Triage Tool for Emergency Departments. Agency for Healthcare Research and Quality. 2018. Available at: https://www.ahrq.gov/professionals/systems/hospital/esi/index.html. Accessed Jan 6, 2020.
9. VanderWeele TJ, Ding P. Sensitivity analysis in observational research: introducing the E-value. Ann Intern Med 2017;167:268–74.
10. Physicians Unevenly Affected by Patient Satisfaction Scores. WebMD LLC. 2019. Available at: https://www.medscape.com/viewarticle/909569. Accessed Nov 20, 2019.