



2015

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Recommended Citation

Shah S, Patel A, Rumoro DP, Hohmann S, Fullam F. Managing patient expectations at emergency department triage. *Patient Experience Journal*. 2015; 2(2):31-44. doi: 10.35680/2372-0247.1090.

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Managing patient expectations at emergency department triage

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Abstract

Emergency departments (ED) overcrowding, long wait, and uncomfortable waiting room conditions may lower perceived quality of the patient experience and satisfaction. This study investigates the relationship between patient satisfaction and communication of expected wait times, at the point of triage. A pre-post (11/4/ 2008 – 2/5/2009) group design with convenience sample (n=1,209) of all discharge adult ED patients was utilized for this study. A static expected wait time model (i.e., average wait time + one standard deviation) based on time of the day, day of the week and triage levels was employed to communicating expected wait time at triage while an in-house survey with five-point Likert-scale patient satisfaction questions (satisfied with wait time in triage, informed about delays, and overall rating of ED visit) was administrated at the discharge desk. The communication of delays intervention was significant for only overall rating of ED, while binary communication status was significantly associated with all three patient satisfaction questions. The patients who didn't receive any communication about delays, were between 1.42 to 5.48 times more likely to rate the three satisfaction questions lower than very good. With communication about delays, the percentage of patients responding very good and very poor/poor were 14.6% higher and 5.9% lower, respectively, for the satisfied with wait time in triage question. Although communication of delays intervention was not significant, the patients who received wait times information were significantly more satisfied. This indicates that patients are more likely to accept longer wait times provided their expectations are managed via communication. Future studies should explore technological solutions for communication of delays and operational improvement initiatives along with alignment of incentives for ED staff to further improve the patient experience.

Keywords

Patient perceptions, patient satisfaction, patient experience, managing expectations, emergency department, communication of delays, and wait times

Introduction

In the last decade, the increasing frequency of Emergency Department (ED) visits has coincided with decreasing numbers of ED's¹ and inpatient beds². Thus, ED's nationwide are under growing pressure to provide care for more patients, resulting in overcrowding, longer wait time³, boarding of admitted patients, and ambulance diversion¹. Thus health care access, as measured by those who left without being seen, efficiency as measured by throughput and wait times, and quality, as measured by patient satisfaction, are adversely affected by overcrowding⁴. With the influx of patients coming into ED's it is becoming progressively more difficult for facilities to get patients through the system in a timely manner due to physical restrictions^{5,6}. Many frontend and backend performance

improvement strategies such as fast-tracking of patients⁷⁻¹⁰, staging consultants in the ED triage¹¹, partnering physician with triage nurse¹², bed-side triage¹³, accelerated triage and registration¹⁴, ED holding area⁸, system collaboration and protocol development for ED to inpatient¹⁵, discharge protocols¹⁶, and inpatient discharge lounge¹⁴ have been attempted with varying success to address ED overcrowding issues and improve throughput.

Waiting is frustrating, can negatively affect perception of quality of care, and is a common cause of patient complaints¹⁷. The 2008 Press Ganey ED pulse report showed that the number one complaint by patients presenting to the ED was not being informed about delays¹⁸. With the ED overcrowding challenges, managing patient expectations has shown to be key factor in

reducing the dissatisfaction levels among patients¹⁹ and improving ED patient experience and satisfaction²⁰. Managing the wait/delays has two major components namely, minimizing the actual wait (i.e., appropriate capacity planning) and ensuring psychological needs and expectations of waiting patients are met²¹. These psychological factors weigh heavily on the patient experience (i.e., overall ED rating as well as waiting related questions)¹². Perceived waiting time is an important determinant of patient satisfaction with an ED visit²² and it has been suggested that lengthy waiting times are the greatest source of patient dissatisfaction with an ED visit²³. There are two distinct dimensions of waiting time: actual (measured) waiting time and perceived (subjective) waiting time.

As per Disconfirmation Paradigm perceptions of a service encounter are characterized by either confirmation or disconfirmation of expectancies²¹. In addition, patient experience/satisfaction is a result of differences between patient's expectations and their perception of meeting those expectations²⁴. Gaining control of these two factors (i.e., reduction in actual wait time as well as management of expectation) can help influence the patient's opinion of their overall experience. Literature also suggests that patients are content/ satisfied with waiting for care and their perception of wait was reduced^{22,25}, provided they are informed appropriately of their situation^{12,18}. In addition patients regardless of their acuity, value effective communication and shorter wait times²¹. Some staff believes in communicating irrespective of the situation is, while others are concerned with negative patients rating in case the unmet patient expectation due to issues beyond their control²⁶. One common theme that most providers do agree with is the idea that forecasting patient wait times is important and with technological innovations, more accurate protocols will be developed to keep the patient informed²⁶. Though providers agree that forecasting patient wait times and communicating it may improve patient experience²⁶, it is difficult due to the nature of ED operations, variance in patient arrival, patient acuity, and uncertainty of delays, among others. In addition, while some EDs are posting their wait times in the ED or internet or billboards, most don't due to forecasting challenges and liability concerns. Thus to improve the patient experience various improvement strategies such as formalized triage by nursing staff⁶, multi-staffed triage²⁵, alternative staffing models⁶, patient liaison nurse²⁷ managing patient expectations upon arrival in the ED²², expressing empathy for patients²⁸, reducing throughput times⁵, guaranteed service level with monetary benefits for unmet service levels^{26,29}, improving communication and information delivery¹⁸ and pamphlets, informational videos, and patient education interventions³⁰ among others have been utilized with varying success. Much of the previous literature supports the notion that communication is an integral piece of the patient care

experience; however few studies explore innovative solutions to solve the complex issues that are associated with emergency care and communicating expected wait times to each individual patient. Communicating the expected wait time upon patient arrival at ED triage may prove to be an effective way to manage patient expectations (i.e., resets the unrealistic expectations of the patient to an appropriate level). Thus the main goals of the project were to 1) develop robust expected wait time estimates from triage to ED roomed by time of day, day of week, and triage level, 2) develop and implement an ED operational intervention for communication of these wait times at triage at a large urban academic medical center, and 3) measure and analyze the effects of the ED intervention through in-house patient satisfaction questionnaire at discharge. The hypothesis was: communicating wait times/delays at ED triage and communication of delays status (yes/no) significantly improves patient satisfaction (i.e., time patient had to wait before they were brought back to treatment room, patient being informed of any delays, and overall rating of ED visit questions).

Methods

The study was a pre-post study design with non-equivalent patients. A convenience sample consisting of 1,209 adult ED discharge patients who returned in-house patient satisfaction questionnaire for the time frame November 4, 2008 through February 5, 2009 were utilized for this study.

The intervention consisted of 1) communicating the expected time from triage to ED roomed (i.e., being in an ED bed) to the patients at triage by the nurse and 2) offering an in-house ED patient satisfaction questionnaire at the discharge desk to the patients. The triage nurse used a standard script^a that was developed by ED administration and a static grid with historical expected wait times by triage levels, day of the week and time of the day (Appendix A). To derive the static grid, we utilized the observed averages and standard deviations of the historical wait times (i.e., triage to ED roomed) from January 1, 2007 to October 31, 2008. The grid had a total of 210 different cells that corresponded to different combinations of triage levels, day of the week and time of the day. Time of the day blocks were based on ED operations and each block was at minimum of 3 hours. To provide reliable estimate

^a *Communication when beds full*: "Based on your complaint and my assessment, your average waiting time will be around (check chart). This is based on historical data we have collected. If I can get you in a bed sooner, I certainly will. If your condition worsens, please notify one of the staff."

Communication when beds open: "Usually the wait time would be around (check chart) for this time of day, but I have an open bed I will place you in it immediately."

of wait times, each cell was populated with average plus one standard deviation and then further rounded up to the nearest 5 or 10. Thus, for example, the expected wait time for a patient with triage level 3 on Monday between 3:00 PM to 6:00 PM was 175 minutes. After the communication of wait times at triage, the patients proceeded with routine care. To measure the intervention's impact, we developed and implemented an in-house ED patient satisfaction questionnaire (Appendix B) with standard communication script at the ED discharge desk. All adult (≥ 18 years) patients with outpatient discharge instructions were given the option to complete the questionnaire. They were kindly requested to place the questionnaire in the drop box near the discharge desk upon completion. These questionnaires were consequently used to evaluate the effectiveness of the front end communication portion of the intervention.

The pre intervention time frame consisted of November 4, 2008 to January 5, 2009 while the post intervention time frame was January 5, 2009 through February 5, 2009. During the pre-intervention time frame, only the in-house ED patient satisfaction questionnaire was implemented, while during the post-intervention timeframe both communicating the expected wait time as well as in-house ED patient satisfaction questionnaire were implemented. For analysis purposes, the first week of both the pre and post interventional samples were excluded to mitigate any roll out issues. We also excluded any incomplete questionnaire as well as multiple ED visit during a 72 hour time frame of each other.

The independent variables were the implementation of the communication of wait times /delays intervention (i.e., pre/post) as well as binary communication of delays status (i.e., patient notified of an estimated wait time irrespective of study timeframe). The outcomes were the 5 level Likert scale patient satisfaction questions: 1) Time patients had to wait before they were brought back to a treatment room (hence forth referred as satisfied with wait time in triage), 2) How well patient was informed about any delays (hence forth referred as informed about delays), and 3) Overall rating of ED visit. The 5 level Likert scale for the patient satisfaction questions were rescaled into 4 levels, namely, Very Good (score of 5), Good (Score of 4), Fair (Score of 3), and Very Poor and Poor (Score of 1 and 2). The moderating variables included ED length of stay (LOS) (0-120; 120-240, 240-360, >360 minutes), age (18-24, 25-44, 45-64, and ≥ 65), gender (male and female), triage level (high [ESI = 3] and low [ESI = 4 and 5]), day of week (Monday through Sunday), time of day (12:00 AM -6:59 AM, 7:00 AM - 11:59 AM, 12:00 PM - 2:59 PM, 3:00 PM - 5:59 PM, 6:00 PM - 8:59 PM, and 9:00 PM - 11:59 PM), and insurance information (Commercial, Managed Care, Medicaid, Medicare, and Self-Pay). Data came from data warehouse and electronic medical records as well as on-site questionnaire. The data from the in-house ED patient

satisfaction questionnaire were translated from paper copies to electronic format (Access database) using double entry approach. Statistical analysis was performed in SPSS software (SPSS Inc., Chicago, IL). Descriptive (i.e., mean, standard deviation, and frequency) and bivariate analysis (t-test and Pearson Chi-squared test) was conducted. In addition, multiple multinomial logistic regressions were utilized to investigate the impact of the interventions and communication status on the patient satisfaction questions after taking into account the moderating variables.

Results

The pre and post intervention samples consisted of 887 and 322 respondents, respectively (Table 1). Females consisted of 68.2% and 63% for the pre and post intervention groups, respectively. Commercial and Medicaid insurance categories together comprise more than 50% of the patients in both groups. The majority of the respondents to the questionnaire were between the ages of 25-44 years for both pre (51.4%), and post (47.5%) groups. During the entire study timeframe, majority ($>45\%$) of patients who returned the survey arrived between 12:00 Noon and 6:00 PM. The distribution of returned surveys by day of the week was between 10.2% and 18.9%. Most patients were between 120 to 360 minutes ($>65\%$) in the ED and had high acuity level (i.e., ESI 3) ($>60\%$). The pre and post groups were statistically different based on LOS and time of the day.

Patients who responded to the in-house patient satisfaction questionnaire provided slightly lower very good rating for satisfied with wait time in triage during the post intervention (48.1%) as compared to pre intervention (49.8%) but were not statistically significant (Table 2). Likewise, patients' favored very good responses for being informed of delays (47.9% pre and 48.4% post) and overall rating of ED visit (60% pre and 56.5% post). Similar characteristics were observed while comparing the patients who were communicated the delays versus not (Table 1 and 2). The bivariate statistics showed that the intervention was statistically significant for the overall rating of ED visit but not for the satisfied with wait time in triage and informed of delays questions. The communication of delays to the patients (yes/no) was statistically significant ($p < 0.01$) for all the three patient satisfaction questions (Table 2 and 3). With the communication of delays, the number of very good rating increased by 14.6%, 24%, and 17.5% for satisfied with wait time in triage, informed of delays, and overall rating of ED visit questions, respectively. Similarly with the communication of delays, the number of very poor and poor rating decreased by 5.9%, 9.9%, and 1.8% for satisfied with wait time in triage, informed of delays, and overall rating of ED visit questions, respectively. Similarly, the interaction term between intervention and communication status was statistically significant ($p < 0.01$)

for all the three patient satisfaction questions (Table 3). Factors such as time of the day and LOS were statistically significant for all three patient satisfaction questions. Age, day of the week, and financial class were statistically significant for at least one of the three patient satisfaction questions while acuity and gender were not statistically significant.

Three separate multinomial logistic regressions were run for the intervention status, communication status, and interaction of intervention and communication status against all moderating and dependent variables (i.e., a total of nine regressions) (Table 4, Table 5, and Table 6). Patients in the post intervention group were 1.42 times more likely to provide a good rating for the overall rating of ED visit than the pre intervention group. Patients who were not communicated with delays were 5.48, 3.4, and 1.83 times more likely to provide very poor & poor, fair, and good ratings, respectively as compared to very good rating on informed about delays question (Table 4). Similarly, patients without communications were between 2.89 to 1.42 and 2.39 to 1.84 more likely to provide lower rating than very good for the satisfied with the wait time in triage and overall rating of ED visit questions, respectively. Patients in the post intervention group who were communicated were 60% and 83% less likely to provide fair and very poor and poor ratings respectively, for informed of delays question as compares to pre intervention non communicated patients. Similarly patients in the pre intervention group who were communicated were 50%, 75%, and 82% less likely to provide good, fair and very poor and poor ratings respectively, for informed of delays question as compares to pre intervention non communicated patients. If the patient's length of stay was ≤ 2 hours, they were 76%, 87%, and 98% less likely to provide good, fair and very poor and poor ratings, respectively for the satisfied with the wait time in triage question as compared to very good rating. In addition, patients within 45 to 64 and 25 to 44 age groups were 4.68 and 3.72 times more likely to give a fair rating, respectively for the satisfied with the wait time in triage question as compared to patients above 65. In addition, patients arriving early in the day (i.e., between 12:00 AM to 12:00 Noon) were less likely to give either fair or very poor and poor rating for satisfied with wait time in triage question as compared to patient arriving between 3:00 PM and 6:00 PM. Time of the day and LOS were statistically significant for all three patient satisfaction questions.

Discussion

Based on the analysis, the intervention of communication of delays (i.e., expected wait time in triage) at ED triage using the static grid didn't result in improved patient satisfaction for satisfied with the wait time in triage and informed about delays questions but had statistically significant relationship with the overall rating of the ED

visit question. Further analysis of communication status regardless of the intervention (i.e., use of the static grid for expected wait times) showed significant improvements in all three patient satisfaction questions. These findings are similar to the literature related to communication and higher patient satisfaction^{18,24,31,32,31}. As expected the indicators of ED congestions such as length of stay and time of the day were exerting influence on the patients' perceptions and satisfactions. In addition, patients between the ages of 25 to 64 had significantly lower patient satisfaction ratings, indicating the need for developing additional communication channels as well as increased frequency of communication to meet their expectations. As the study was focused on the discharged patients (mainly triage level 3, 4, and 5), the acuity didn't affect the patient satisfaction ratings. Some of the other factors that may have contributed to the findings include the fluctuation in the ED volumes as well as multiple process improvement initiatives running simultaneously.

The enabling factors for development and implementation of the interventions were that it was a low cost, non-clinical intervention developed based on customer feedback and with the support of the hospital leadership. The main goal of the intervention was to improve communications of delays and managing the patients' perceptions of wait time without affecting clinical care and/or reducing operational inefficiencies. Based on discussions with the ED leadership and some of the front line staff, it was determined that the static grid with expected wait times was rarely utilized in triage for communication of delays. The static grid was difficult to read and interpret. In addition, as communication of delays was an additional non clinical step, it did not make the priority list and was often not used. Another potential reason for not utilizing the tools may have been the lack of trust with the technological solutions (i.e., static grid) as well as the calculated estimate wait times. Based on prior experiences, nurses may be hesitant to communicate the delays from the static grid as they may not be aware of the exact ED situation as well as expected inflow of potentially higher acuity patients. Given the uncertainty, they didn't want to communicate the expected wait time and face unhappy patients if the wait times were not met. In addition, limited formal staff training due to the nature of the study and its stringent time frame may have further contributed to lower adoption rate. Finally, the tools low utilization may be due to lack of feedback on its utilization to the staff as well as the non-alignment of the patient satisfaction performance with nursing compensation.

The implementation of in-house patient satisfaction questionnaire resulted in a higher response rate (25-30%) than traditional methods such as mail (8%) and telephone surveys. As the patient satisfaction questionnaire was administrated at the discharge desk, it was convenient for the patients to complete them as well as provide more

accurate assessment of the just concluded ED visit and clinical care. Though the response rates were higher, it could also result in potential bias such as inflated view of the patient's satisfaction³³ as well as selective participation³⁴ as the patients may feel uncomfortable providing their assessment with ED staff around. Displaying signage indicating the organization's commitment for feedback along with easily accessible patient satisfaction questionnaire forms and better training of the discharge coordinators may further improve the response rates. The administration of the in-house patient satisfaction questionnaire continued well after the end of the intervention pilot and was used to gather one-day lag patient's ratings and comments. With the review of the comments, it became possible to recovery services through phone calls where appropriate. In addition, these patients' comments were shared with the leadership and staff on the ongoing bases.

Based on the data irrespective of intervention timeframes, there were ED nurses who were communicating the expected delays to the patients at triage. These nurses were relying on their experiences and training for anticipating and communicating the delays. As communication of delays with or without the utilization of the static grid significantly improved satisfaction, it indicates that mere communications of delays sets different patient expectations regarding the wait times. In addition, if the expectations are met, it may positively influence the patients' perceptions and in turn higher patient satisfaction ratings. With a 6% to 10% drop in very poor and poor rating for the satisfied with wait time in triage and informed about the delays along with 14% to 24% increase in very good rating, the overall performance on patient satisfaction of the organization can be significantly improved by at least 0.34 points on a scale of 1 to 5. With such improvements, the relative ranking of the organizations on HCAPS will improve resulting in higher reimbursements through value base purchasing mechanisms. In addition, satisfied patients are more likely to recommend the organization as well as demonstrate a higher willingness to return³⁵, creating brand loyalty. This re-enforces the value of just managing the patient's expectations through communication of delays without changes in clinical care and/or reduction in any operational inefficiencies.

To further validate the findings and operationalize the communication of delay at triage intervention, there is a need for formal training of staff, increased compliance with utilization of tool, as well as administration of questionnaire in both English and Spanish language for longer timeframes. In addition, the questionnaire could be reexamined for content as well as comprehension for an average ED patient. To improve the compliance with the tool, technological solutions²⁶ such as electronic medical records based automated prompts with expected delays to

triage nurses during triage for communication with the patients and/or dashboard with expected wait times in the waiting room among others can be investigated. In addition, further refinement of expected wait time calculation can be conducted.

In addition, linking nurse performance evaluation to the patient satisfaction scores and mandating the utilization of the tool may further assist in compliance and improved outcomes. In addition, performing random checks on staff for evaluating compliance with the use of the tool and administration of questionnaire may further assist in standardization of the process and control variability in response rates²⁵. The gains in the patient satisfactions scores purely due to just communication (i.e., greater access to information regarding their visit)¹⁸ may not be sustainable with longer wait times, indicating that operational efficiency initiatives need to work in tandem along with communication/change initiatives. Finally, it is even possible that providing the patient with an estimated wait time may heighten their expectations which may leave room for additional exploration in future studies.

The results of this study show that communication between staff and patients does indeed yield greater patient satisfaction. However, further exploration around more effective ways to manage patient expectations and compliance with the initiatives via staff training, process standardization, technological solutions, and incentive alignment is required. With the public reporting of both ED performance^{b, 36,37} and patient satisfaction^{c, 38} metrics, it is becoming increasingly apparent to focus not only on providing the best clinical care but also improving operational efficiency (i.e., lean workflows), while at the same time being patient centered/customer focused. Therefore the results and recommendations (i.e., importance of communication and simple easy to use tools to determine wait times among others) of the study, though conducted in 2009, are still relevant and can be easily adapted by most EDs in today's changing environment.

^b Hospital Compare; main elements: door to doctor time, length of stay for admitted and discharge patients, time to administration of pain medication, left without been seen rate, and waiting time for inpatient bed among others

^c Emergency Department Patient Experiences with Care (EDPEC) Survey; main elements: patient experiences with ED arriving, during the stay ED care, and post ED visit.

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Table 1: Descriptive and bivariate results for sample comparisons

Variables		Intervention status		Communication status	
		Post (n=332) # (%); Mean (Stddev)	Pre (n=887) # (%); Mean (Stddev)	No (n=852) # (%); Mean (Stddev)	Yes (n=357) # (%); Mean (Stddev)
Age (years)		37 ± 15.1	37.3 ± 15.3	36.9 ± 14.9	38.1 ± 15.9
LOS (Minutes)		240.3 ± 134.2	250.5 ± 160.8	251.8 ± 145.7	238.2 ± 172.5
Gender	Female	203 (63%)	605 (68.2%)	573 (67.3%)	235 (65.8%)
Financial class	Commercial	95 (29.5%)	237 (26.7%)	235 (27.6%)	97 (27.2%)
	Managed care	53 (16.5%)	171 (19.3%)	159 (18.7%)	65 (18.2%)
	Medicaid	78 (24.2%)	237 (26.7%)	231 (27.1%)	84 (23.5%)
	Medicare	31 (9.6%)	70 (7.9%)	67 (7.9%)	34 (9.5%)
	Self-Pay	65 (20.2%)	172 (19.4%)	160 (18.8%)	77 (21.6%)
Age	18-24	82 (25.5%)	190 (21.4%)	184 (21.6%)	88 (24.6%)
	25-44	153 (47.5%)	456 (51.4%)	438 (51.4%)	171 (47.9%)
	45-64	72 (22.4%)	186 (21%)	185 (21.7%)	73 (20.4%)
	65+	15 (4.7%)	55 (6.2%)	45 (5.3%)	25 (7%)
Time of the day ¹	12:00 AM -6:59 AM	27 (8.4%)	53 (6%)	59 (6.9%)	21 (5.9%)
	7:00 AM - 11:59 AM	53 (16.5%)	222 (25%)	198 (23.2%)	77 (21.6%)
	12:00 PM - 2:59 PM	79 (24.5%)	220 (24.8%)	209 (24.5%)	90 (25.2%)
	3:00 PM - 5:59 PM	68 (21.1%)	196 (22.1%)	182 (21.4%)	82 (23%)
	6:00 PM - 8:59 PM	58 (18%)	113 (12.7%)	127 (14.9%)	44 (12.3%)
	9:00 PM - 11:59 PM	37 (11.5%)	83 (9.4%)	77 (9%)	43 (12%)
Day of the week	Monday	59 (18.3%)	124 (14%)	126 (14.8%)	57 (16%)
	Tuesday	61 (18.9%)	146 (16.5%)	158 (18.5%)	49 (13.7%)
	Wednesday	42 (13%)	137 (15.4%)	127 (14.9%)	52 (14.6%)
	Thursday	33 (10.2%)	101 (11.4%)	89 (10.4%)	45 (12.6%)
	Friday	41 (12.7%)	131 (14.8%)	124 (14.6%)	48 (13.4%)
	Saturday	37 (11.5%)	106 (12%)	101 (11.9%)	42 (11.8%)
	Sunday	49 (15.2%)	142 (16%)	127 (14.9%)	64 (17.9%)
Length of stay ^{1,2}	0-120	42 (13%)	146 (16.5%)	121 (14.2%)	67 (18.8%)
	121-240	139 (43.2%)	349 (39.3%)	343 (40.3%)	145 (40.6%)
	241-360	105 (32.6%)	231 (26%)	235 (27.6%)	101 (28.3%)
	361+	36 (11.2%)	161 (18.2%)	153 (18%)	44 (12.3%)
Acuity	High	226 (70.2%)	574 (64.7%)	565 (66.3%)	235 (65.8%)
	Low	96 (29.8%)	313 (35.3%)	287 (33.7%)	122 (34.2%)

Note: ¹: Statistically significant (p<0.05) for Intervention status; ²: Statistically significant (p<0.05) for Communication status.

Table 2: Bivariate results for the patient satisfaction questions and intervention and communication status

Variables		Intervention status			Communication status		
		Post (n=332) # (%); Mean (Stddev)	Pre (n=887) # (%); Mean (Stddev)	Significance	No (n=852) # (%); Mean (Stddev)	Yes (n=357) # (%); Mean (Stddev)	Significance
Satisfied with wait time in triage ²	Very poor & poor	27 (8.4%)	91 (10.3%)	0.2262	98 (11.5%)	20 (5.6%)	<0.001
	Fair	45 (14%)	141 (15.9%)		147 (17.3%)	39 (10.9%)	
	Good	95 (29.5%)	213 (24%)		223 (26.2%)	85 (23.8%)	
	Very good	155 (48.1%)	442 (49.8%)		384 (45.1%)	213 (59.7%)	
Informed of delays ²	Very poor & poor	32 (9.9%)	103 (11.6%)	0.8578	120 (14.1%)	15 (4.2%)	<0.001
	Fair	50 (15.5%)	139 (15.7%)		158 (18.5%)	31 (8.7%)	
	Good	84 (26.1%)	220 (24.8%)		225 (26.4%)	79 (22.1%)	
	Very good	156 (48.4%)	425 (47.9%)		349 (41%)	232 (65%)	
Overall rating of ED visit ^{1,2}	Very poor & poor	6 (1.9%)	33 (3.7%)	0.0261	32 (3.8%)	7 (2%)	<0.001
	Fair	30 (9.3%)	103 (11.6%)		111 (13%)	22 (6.2%)	
	Good	104 (32.3%)	219 (24.7%)		250 (29.3%)	73 (20.4%)	
	Very good	182 (56.5%)	532 (60%)		459 (53.9%)	255 (71.4%)	

Note: 1: Statistically significant ($p < 0.05$) for Intervention status; 2: Statistically significant ($p < 0.05$) for Communication status.

Table 3: Bivariate results for the patient satisfaction questions and independent and moderating variables

Variables	Satisfied with wait time in triage	Informed of delays	Overall rating of ED visit
Intervention status			*
Communication status	**	**	**
Intervention status X communication status	**	**	**
Financial class	*		
Time of the day	**	**	*
Day of the week	**		
Length of stay	**	**	**
Age	*	*	

Note: * Denotes significance at the 0.05 level and ** denotes significance at 0.01 level; Acuity and Gender were not significant

Table 4: Multinomial logistic regression results for patient satisfaction questions and intervention and communication status.

Patient satisfaction questions		Intervention status Reference - Pre	Communication status Reference - Yes	Interaction Intervention status & Communication status Reference - Pre-No		
		Post	No	Post-Yes	Post-No	Pre-Yes
Satisfied with wait time in triage	Good	1.24 (0.9 - 1.7)	1.42 (1.04 - 1.94)*	0.99 (0.6 - 1.64)	1.12 (0.76 - 1.65)	0.63 (0.43 - 0.92)*
	Fair	0.85 (0.56 - 1.27)	2.09 (1.39 - 3.15)*	0.38 (0.18 - 0.83)*	0.86 (0.54 - 1.38)	0.49 (0.3 - 0.78)*
	Very poor & poor	0.81 (0.48 - 1.38)	2.89 (1.64 - 5.1)*	0.45 (0.18 - 1.08)	0.68 (0.36 - 1.27)	0.27 (0.13 - 0.54)*
Informed of Delays	Good	1.07 (0.78 - 1.48)	1.83 (1.34 - 2.5)*	0.67 (0.4 - 1.11)	0.99 (0.67 - 1.46)	0.5 (0.34 - 0.73)*
	Fair	1.03 (0.7 - 1.52)	3.4 (2.21 - 5.23)*	0.4 (0.2 - 0.81)*	0.94 (0.6 - 1.47)	0.25 (0.15 - 0.42)*
	Very poor & poor	0.87 (0.55 - 1.39)	5.48 (3.06 - 9.81)*	0.17 (0.06 - 0.48)*	0.9 (0.53 - 1.51)	0.18 (0.09 - 0.36)*
Overall rating of ED visit	Good	1.42 (1.05 - 1.91)*	1.84 (1.35 - 2.5)*	0.84 (0.52 - 1.37)	1.38 (0.97 - 1.97)	0.5 (0.34 - 0.74)*
	Fair	0.89 (0.56 - 1.41)	2.79 (1.7 - 4.57)*	0.24 (0.08 - 0.69)*	1.01 (0.6 - 1.67)	0.4 (0.23 - 0.7)*
	Very poor & poor	0.54 (0.22 - 1.36)	2.39 (1.02 - 5.61)*	0.2 (0.03 - 1.51)	0.58 (0.21 - 1.62)	0.44 (0.17 - 1.12)

Note: * Denotes significance at the 0.05 level

Table 5: Sample multivariate results for satisfied with wait time in triage questions and intervention status.

Variables		Satisfied with wait time in triage		
		Good	Fair	Very poor & poor
Gender	Female	0.81 (0.6 - 1.11)	1.24 (0.83 - 1.86)	0.88 (0.54 - 1.46)
Age	18-24	1.27 (0.6 - 2.69)	2.81 (0.86 - 9.19)	0.61 (0.12 - 3.14)
	25-44	1.46 (0.68 - 3.15)	3.72 (1.13 - 12.29)*	1.67 (0.34 - 8.28)
	45-64	1.98 (0.87 - 4.49)	4.68 (1.35 - 16.23)*	2.63 (0.51 - 13.6)
	65+			
Acuity	High	0.86 (0.62 - 1.18)	0.81 (0.55 - 1.21)	0.41 (0.25 - 0.68)*
	Low			
Time of the day	12:00 AM - 6:59 AM	0.48 (0.25 - 0.94)*	0.25 (0.09 - 0.67)*	0.25 (0.07 - 0.92)*
	7:00 AM - 11:59 AM	0.79 (0.51 - 1.21)	0.39 (0.23 - 0.67)*	0.16 (0.07 - 0.36)*
	12:00 PM - 2:59 PM	0.9 (0.58 - 1.38)	0.81 (0.5 - 1.31)	0.96 (0.54 - 1.69)
	3:00 PM - 5:59 PM			
	6:00 PM - 8:59 PM	1.15 (0.7 - 1.87)	0.91 (0.51 - 1.62)	0.95 (0.47 - 1.91)
	9:00 PM - 11:59 PM	0.62 (0.36 - 1.09)	0.58 (0.3 - 1.12)	0.2 (0.05 - 0.7)*
Day of the week	Monday			
	Tuesday	1.14 (0.68 - 1.92)	1.14 (0.63 - 2.06)	0.72 (0.36 - 1.44)
	Wednesday	1.24 (0.73 - 2.13)	1.02 (0.54 - 1.92)	0.86 (0.42 - 1.79)
	Thursday	0.88 (0.5 - 1.56)	0.43 (0.2 - 0.91)*	0.55 (0.25 - 1.23)
	Friday	0.85 (0.49 - 1.48)	0.87 (0.47 - 1.61)	0.55 (0.26 - 1.15)
	Saturday	0.98 (0.56 - 1.72)	0.68 (0.34 - 1.35)	0.18 (0.05 - 0.64)*
	Sunday	0.9 (0.53 - 1.52)	0.68 (0.36 - 1.28)	0.23 (0.09 - 0.58)*
Length of stay	0-120	0.24 (0.13 - 0.42)*	0.13 (0.06 - 0.29)*	0.02 (0.01 - 0.08)*
	121-240	0.45 (0.28 - 0.7)*	0.34 (0.2 - 0.58)*	0.07 (0.04 - 0.14)*
	241-360	0.61 (0.38 - 0.98)*	0.8 (0.47 - 1.35)	0.44 (0.25 - 0.78)*
	361+			
Financial class	Commercial			
	Managed care	0.71 (0.46 - 1.1)	1.04 (0.6 - 1.79)	0.49 (0.24 - 0.99)*
	Medicaid	0.98 (0.65 - 1.47)	1.58 (0.96 - 2.59)	0.88 (0.48 - 1.6)
	Medicare	1.75 (0.9 - 3.38)	1.98 (0.82 - 4.76)	0.34 (0.07 - 1.65)
	Self-Pay	0.82 (0.53 - 1.27)	1.28 (0.75 - 2.19)	0.61 (0.32 - 1.16)
Pre/Post	Post	1.24 (0.9 - 1.7)	0.85 (0.56 - 1.27)	0.81 (0.48 - 1.38)

Note: * Denotes significance at the 0.05 level

Table 6: Sample multivariate results for satisfied with wait time in triage questions and communication status.

Variables		Satisfied with wait time in triage		
		Good	Fair	Very poor & poor
Gender	Female	0.81 (0.6 - 1.11)	1.26 (0.84 - 1.88)	0.87 (0.53 - 1.44)
Age	18-24	1.32 (0.62 - 2.8)	2.77 (0.84 - 9.18)	0.51 (0.09 - 2.74)
	25-44	1.47 (0.68 - 3.18)	3.61 (1.08 - 12.1)*	1.46 (0.28 - 7.52)
	45-64	2.01 (0.89 - 4.58)	4.54 (1.29 - 15.96)*	2.23 (0.41 - 12)
	65+			
Acuity	High	0.86 (0.63 - 1.19)	0.82 (0.55 - 1.21)	0.41 (0.25 - 0.68)*
	Low			
Time of the day	12:00 AM -6:59 AM	0.48 (0.24 - 0.93)*	0.22 (0.08 - 0.61)*	0.21 (0.06 - 0.77)*
	7:00 AM - 11:59 AM	0.76 (0.5 - 1.17)	0.38 (0.22 - 0.66)*	0.16 (0.07 - 0.35)*
	12:00 PM - 2:59 PM	0.9 (0.59 - 1.38)	0.8 (0.49 - 1.3)	0.92 (0.52 - 1.63)
	3:00 PM - 5:59 PM			
	6:00 PM - 8:59 PM	1.14 (0.7 - 1.86)	0.86 (0.48 - 1.52)	0.88 (0.43 - 1.77)
	9:00 PM - 11:59 PM	0.63 (0.36 - 1.1)	0.59 (0.3 - 1.13)	0.18 (0.05 - 0.68)*
Day of the week	Monday			
	Tuesday	1.11 (0.66 - 1.87)	1.09 (0.6 - 1.97)	0.66 (0.33 - 1.32)
	Wednesday	1.22 (0.71 - 2.08)	1.02 (0.54 - 1.93)	0.86 (0.41 - 1.78)
	Thursday	0.87 (0.49 - 1.54)	0.43 (0.2 - 0.91)*	0.54 (0.24 - 1.21)
	Friday	0.83 (0.48 - 1.45)	0.85 (0.46 - 1.58)	0.53 (0.25 - 1.12)
	Saturday	0.96 (0.55 - 1.67)	0.65 (0.33 - 1.31)	0.17 (0.05 - 0.6)*
	Sunday	0.88 (0.52 - 1.49)	0.69 (0.36 - 1.3)	0.23 (0.09 - 0.58)*
Length of stay	0-120	0.25 (0.14 - 0.44)*	0.14 (0.07 - 0.31)*	0.03 (0.01 - 0.09)*
	121-240	0.47 (0.3 - 0.73)*	0.34 (0.2 - 0.58)*	0.07 (0.03 - 0.14)*
	241-360	0.64 (0.4 - 1.04)	0.82 (0.48 - 1.38)	0.46 (0.26 - 0.81)*
	361+			
Financial class	Commercial			
	Managed care	0.7 (0.45 - 1.09)	1.03 (0.6 - 1.79)	0.48 (0.23 - 0.98)*
	Medicaid	0.97 (0.64 - 1.45)	1.56 (0.95 - 2.57)	0.88 (0.48 - 1.61)
	Medicare	1.77 (0.91 - 3.44)	1.97 (0.81 - 4.78)	0.31 (0.06 - 1.59)
	Self-Pay	0.84 (0.54 - 1.3)	1.33 (0.77 - 2.28)	0.63 (0.33 - 1.21)
Communication status	No	1.42 (1.04 - 1.94)*	2.09 (1.39 - 3.15)*	2.89 (1.64 - 5.1)*

Note: * Denotes significance at the 0.05 level

Appendix A. Sample Wait Time (Triage to ED Roomed) Static Model

	From	12:00 AM	7:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM
	TO	7:00 AM	12:00 PM	3:00 PM	6:00 PM	9:00 PM	12:00 AM
Monday	Level 1	Immediate	Immediate	Immediate	Immediate	5	5
	Level 2	10	15	40	65	65	35
	Level 3	35	40	155	175	160	120
	Level 4	40	40	150	165	160	150
	Level 5	10	25	170	130	155	145
Tuesday	Level 1	5	Immediate	15	5	Immediate	Immediate
	Level 2	10	15	40	55	45	20
	Level 3	35	35	35	140	145	115
	Level 4	60	35	120	135	145	110
	Level 5	25	25	125	55	120	120
Wednesday	Level 1	5	5	5	5	Immediate	5
	Level 2	20	15	30	35	15	55
	Level 3	40	40	140	165	150	100
	Level 4	40	40	155	180	155	90
	Level 5	85	10	130	180	90	85
Thursday	Level 1	5	5	5	Immediate	Immediate	Immediate
	Level 2	20	5	35	25	30	15
	Level 3	35	25	100	115	95	70
	Level 4	45	25	95	120	120	90
	Level 5	45	15	30	85	65	130
Friday	Level 1	5	5	5	Immediate	5	Immediate
	Level 2	5	10	30	20	10	25
	Level 3	20	20	75	95	85	80
	Level 4	35	20	70	120	105	80
	Level 5	25	20	10	120	125	70
Saturday	Level 1	5	Immediate	Immediate	15	0	Immediate
	Level 2	5	5	15	10	10	20
	Level 3	30	15	65	80	65	60
	Level 4	35	20	55	60	70	50
	Level 5	15	15	30	45	35	40
Sunday	Level 1	10	5	Immediate	15	5	Immediate
	Level 2	15	5	5	20	10	20
	Level 3	35	20	55	75	65	45
	Level 4	25	25	65	75	70	50
	Level 5	10	5	40	55	60	20
	Less Than	20					
	20-60	20					
	60-120	60					
	Greater than	120					
	Blank	Immediate					

Appendix B. Sample Department of Emergency Medicine In-House Questionnaire.

Emergency Department Operational Use Only

Medical Record #:- _____

Encounter #:- _____

EMERGENCY DEPARTMENT QUALITY SURVEY OF COMMUNICATION AND DELAYS

Please read:

Please take a few minutes and let us know about your experiences in the ORGANIZATION'S Emergency Department/ Your answers will help us make the experience for patients better. All your answers are confidential; your name will not be associated with anything you say.

How would you rate the following question? Circle the best answer.

- 1) Did someone tell you how long your wait time would be? Yes No
a. If yes, how long were you told your wait would be in Minutes? _____

How satisfied you were on each of the following:

	Very poor	Poor	Fair	Good	Very good
2) Time you had to wait before you were brought back to a treatment room	1	2	3	4	5
3) Courtesy of staff (Nurses, physicians, technicians, residents, students)	1	2	3	4	5
4) How well were you informed about any delays	1	2	3	4	5
5) Overall rating of your Emergency Department visit	1	2	3	4	5

Please provide additional comments below:

Thanks you for your time in completing this survey!
Emergency Department Operational Use only