



The Effect of Time-to-Provider, Left-without-Treatment and Length-of-Stay on Patient Satisfaction in Training Hospitals' Emergency Department, Iran

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Abstract

Background: It is necessary to consider into hospital emergency services' quantity and quality in different aspects such as time-to-provider, left-without-treatment and length-of-stay. The aim of this research was to identify the effect of these factors on patient satisfaction in training hospitals.

Methods: In this descriptive-analytical and cross-sectional study, the sample size was calculated 768. The instrument included 54 questions and 8 sections. Three questions were in the field of following factors: 1) Time to provider was defined as the time from initial triage to initial provider evaluation. 2) Left-without-Treatment patients were defined as those who were initially triaged but were unable to be evaluated by a provider because they had left the ED. 3) Length-of-Stay was defined as time from initial triage to the time of final ED disposition, either discharge or admission. It was analyzed by descriptive statistics, simple logistic regression, multiple logistic regressions, simple linear regression and multiple linear regression.

Results: The time-to-provider lower than 15 minutes, LWOT and LOS lower than 6 hours were 92.8%, 3.9% and 90.3%, respectively. The mean of time-to-provider and the mean of LOS were 18.1 minutes and 202 minutes. Time-to-Provider affected satisfaction of admission, guardians, nursing care and managing proceedings ($P < 0.001$). LOS affected satisfaction of admission, guardians and diagnosis proceedings ($P < 0.01$). LWOT did not affect satisfaction and its domains ($P > 0.05$).

Conclusion: Decreasing time-to-provider and LOS has the effect on patient satisfaction in some domains. Furthermore, left-without-treatment rate is not a good proxy of patient satisfaction.

Keywords: Time-to-Provider, Left-without-Treatment, Length-of-Stay, Satisfaction

Introduction

Patient satisfaction in emergency departments (EDs) needs to be addressed according to health care reform (1). Improving satisfaction of emergency services represents an opportunity to reduce the occurrence of costly ED return visits and to increase continuity and satisfaction of care (2). Patients who are satisfied with ED care have greater intentions to return to the same ED, and are less likely to have complaints or to initiate lawsuits (3).

Patient's satisfaction is the difference between a patient's perception and expectation. Changes in wait experience decrease the perceived waiting times without a change in actual waiting times. Patients arrive with expectations around the component of care such as waiting times or overall time in the ED. These are affected by individual-specific, pre-encounter, and intra-encounter factors. The factors can be managed during the care

process to improve patient's satisfaction when they are identified (4).

The fundamental challenges of hospital emergencies' satisfaction are the high left-without-treatment, the prolonged time-to-provider and length-of-stay (5). Time-to-provider is defined as the time from initial triage to initial provider evaluation. LWOT patients are defined as those who are initially triaged but were unable to be evaluated by a provider because they have left the ED. LOS is defined as time from initial triage to the time of final ED disposition, either discharge or admission (6).

Patients who leave without treatment are at risk for worsening morbidity and mortality due to delay in diagnosis and treatment of their current conditions (7). In addition, high time-to-provider, LWOT and LOS negatively affect several domains of quality such as timeliness, safety, and patient centeredness (8). In addition to the impact on quality, they are directly associated with lost hospital revenues (9). The impact on quality and finances has led many emergency managers to pay increasing attention to this metrics (7).

Although the link between LOS, time-to-provider and other factors with satisfaction were separately published in many studies, none of them concurrently assesses the effect of time-to-provider, LWOT, LOS and other factors on satisfaction and its domains. It was not examined on satisfaction of staff ignore clinical services, separately. It does not clarify whether time-to-provider, LWOT and LOS affect satisfaction in addition to other factors or not.

The aim of this research was to identify the effect of time-to-provider, LWOT and LOS on patient satisfaction in training hospitals.

Materials and Methods

In this descriptive-analytical and cross-sectional study, the statistical population was patients of selected hospitals in Tehran and Shahid Beheshti University of Medical Sciences' ED, Tehran, Iran in 2014.

The favorable perception of satisfaction, maximum deviation and confidence interval were re-

spectively considered 50%, 5% and 95% for maximizing the sample size. It was calculated by following formula for each university:

$$n = \frac{Z_{1-\alpha/2}^2 \times p \times (1-p)}{d^2} = \frac{(1.96)^2 \times 0.5 \times 0.5}{(0.05)^2} = 384$$

It was calculated 768 for both universities. According to gather 65 samples from each hospital, 6 hospitals were selected from each university. It included 3 general and 3 specialized hospitals. Homogenous and symmetry were considered in selecting hospitals. The instrument was the questionnaire of Deputy of Curative Affairs of Tehran University of Medical Sciences(10)in 54 question-sand 8 sections:

- Demographic Characteristics and Medical information(19 Questions);
- Domains of Satisfaction: Admission (3 Questions), Guardians (1 Question), Clinical Proceedings (5 Questions), Nursing Care (5 Questions), Diagnosis Proceedings (4 Questions), Environment (9 Questions) and Managing Proceedings (8 Questions).

The five-level Likert scale was employed for the responses: strongly disagree (1 score), disagree (2 score), neither (3 score), agree (4 score) and strongly agree (5 score). The demographic characteristics, medical information, time-to-provider, length-of-stay, left-without-treatment and phone numbers were retrospectively obtained from medical records of patients attending in EDs from April 2013 to January 2014. The records were randomly selected. Satisfaction survey was conducted by telephone contacts from July to December 2014. If there were not any of this information, the patient was excluded from study. The response rate was 97.66% (750 patients).

The questionnaire was handed to some experts in order to revise it. The reliability was tested on 50 patients. The Cronbach's alpha was calculated 0.87. We prepared the final questionnaire after altering some questions and eliminating irrelevant questions. It was analyzed by SPSS and descriptive statistics (Chicago, IL, USA), simple logistic regression, multiple logistic regression, simple linear regression and multiple linear regression.

The study was approved by Research Council of TUMS. Informed consent was obtained from participants. Participants were assured that their participation was voluntary and their responses would be treated with confidentiality.

Results

The attendants' demographic characteristics were as follows: 57.3% women, 56.8% older than 45, 63.1% covered by social insurance, 92.7% urban, 56% married, 58.7% lower than high school and 68.4% covered by coinsurance. The payment was higher at Shahid Beheshti University. The most of payments was the mixture of out-of-pocket and insurance. The satisfaction was higher in all domains at Tehran University with the exception of managing proceedings.

The mean of time to provider was 18.1 minutes (SD=0.12). The proportion of time-to-provider lower than 15 minutes was 92.8%. The proportion of LWOT was 3.9%. The mean of length-of-stay was 202 minutes (SD=10). The proportion of LOS lower than 360 minutes was 90.3%. The contributory factors of them were:

- Time-to-Provider: university (OR=1.95, $P<0.01$), age (OR=0.52, $P<0.01$), gender

(OR=0.39, $P<0.001$), marital status (OR=0.48, $P<0.01$), co-insurance (OR=0.52, $P<0.05$), presence of emergency specialist (OR=0.45, $P<0.01$), type of payment (OR=1.6, $P<0.05$), shift (OR=0.21, $P<0.001$);

- LWOT: gender (OR=2.36, $P<0.05$), shift (OR=0.41, $P<0.05$);

- LOS: disease/percussion severity (OR=6.48, $P<0.001$).

The Time-to-provider, LWOT, LOS and other significant contributory factors were imported in the final multiple linear regression model for adjusting possible problematical factors and achieving final independent factors by backward method. The results are summarized in Table 1 and 2. Time-to-provider affected satisfaction of these domains: admission ($\beta=0.174$, $P<0.001$), guardians ($\beta=0.169$, $P<0.001$), nursing care ($\beta=-0.098$, $P=0.008$) and managing proceedings ($\beta=-0.129$, $P<0.001$). LWOT did not affect patient satisfaction and its domains ($P>0.05$). LOS affected the satisfaction of these domains: admission ($\beta=-0.118$, $P=0.001$), guardians ($\beta=-0.110$, $P=0.002$) and diagnosis proceedings ($\beta=0.095$, $P=0.009$). They did not affect total satisfaction ($P>0.05$).

Table 1: The results of multiple linear regression analyses of contributory factors of satisfaction of staffing services

Domains of Satisfaction	Variable	B	SE	β	T	CI	P-Value
Admission	Constant	8.242	0.318		7.98	(7.788-8.878)	<0.001
	Type of Payment	0.574	0.108	0.182	5.3	(0.361-0.787)	<0.001
	Hometown	1.594	0.362	0.151	4.402	(0.883-2.306)	<0.001
	LOS	-0.009	0.003	-0.118	-3.428	(-0.004)	0.001
						0.014	
	Presence of Emergency Specialist	0.936	0.187	0.174	5.002	(0.569-1.304)	<0.001
	Time-to-Provider	0.018	0.004	0.174	4.896	(0.011-0.026)	<0.001
	University	-0.623	0.184	-0.116	-3.395	(-0.263)	0.001
						0.984	
	Marital Status	0.649	0.186	0.120	3.487	(0.283-1.014)	0.001
Coverage of Insurance	-0.562	0.284	-0.068	-1.982	(-0.005)	0.048	
					1.199		

Table 1: Cond...

Model	R=0.663, R ² =0.439, ΔR ² =0.432, SE _E =8.894, F=60.646, P<0.05							
Guardians	Constant	2.434	0.037		3.861	(2.360-2.508)	<0.001	
	Hometown	0.578	0.127	0.158	4.562	(0.329-0.827)	<0.001	
	Age	0.007	0.001	0.153	4.418	(0.004-0.010)	<0.001	
	Time-to-Provider	0.006	0.001	0.169	4.712	(0.004- 0.009)	<0.001	
	Presence of Emergency Specialist	0.296	0.068	0.155	4.378	(0.163-0.429)	<0.001	
	University	-0.227	0.066	-0.119	-3.432	(-- -0.097)	0.001	
	LOS	-0.003	0.001	-0.110	-3.141	(- --0.001)	0.002	
	Type of Payment	0.095	0.039	0.084	2.420	(0.018-0.171)	0.016	
	Model	R=0.361, R ² =0.131, ΔR ² =0.124, SE _E =19.565, F=18.458, P<0.05						
	Environment	Constant	22.703	1.507		3.748	(19.689-25.717)	<0.001
Gender		-3.267	0.525	-0.213	-6.236	(-2.244)-4.306-	<0.001	
Severity and Acute of Disease or Percussion		-1.684	0.331	-0.180	-5.089	(---1.035)	<0.001	
Type of Referral		2.390	0.649	0.133	3.685	(1.177-3.664)	<0.001	
University		-2.130	0.512	-0.140	-4.158	(- - -1.124)	<0.001	
Education		-0.665	0.202	-0.117	-3.298	(- - -0.269)	0.001	
Hometown		3.207	1.023	0.107	3.135	(1.199-5.216)	0.002	
Marital Status	1.193	0.534	0.078	2.232	(0.144-2.242)	0.026		
Shift	0.690	0.346	0.070	1.994s	(0.011-1.368)	0.046		
Model	R=0.908, R ² =0.825, ΔR ² =0.808, SE _E =2.636, F=47.238, P<0.05							
Managing Proceedings	Constant	9.629	0.512		2.549	(8.605-10.653)	<0.001	
	Presence of Emergency Specialist	1.249	0.256	0.173	4.878	(0.747-1.752)	<0.001	
	Coverage of Co-Insurance	1.137	0.271	0.147	4.193	(0.605-1.670)	<0.001	
	Education	-0.309	0.094	-0.115	-3.287	(-- -0.121)	0.001	
	Time-to-Provider	-0.018	0.005	-0.129	-3.568	(- - -0.008)	<0.001	
	Gender	-0.824	0.252	-0.113	-3.276	(- - -0.330)	0.001	
	University	0.683	0.682	0.095	2.736	(0.193 -1.174)	0.006	
Model	R=0.353, R ² =0.125, ΔR ² =0.118, SE _E =3.391, F=17.521, P<0.01							

Table 2: The Results of Multiple Linear Regression Analyses of Contributory Factors of Satisfaction of Clinical Services and Total Satisfaction

Domains of Satisfaction	Variable	B	SE	β	T	CI	P-Value
Clinical Proceedings	Constant	17.576	1.024		13.845	(15.528-19.624)	<0.001
	University	-1.867	0.272	-0.237	-6.830	(-2.390-1.323)	<0.001
	Presence of Emergency Specialist	0.954	0.274	0.122	3.478	(0.416-1.493)	0.001
	Gender	-0.938	0.276	-0.119	-3.398	(-1.480-0.396)	0.001
	Coverage of Co-Insurance	0.988	0.295	0.117	3.352	(0.409-1.566)	0.001
	Coverage of Insurance	-0.929	0.420	-0.077	-2.214	(-1.753-0.105)	0.027
	Model	R=0.681, R ² =0.463, Δ R ² =0.458, SE _E =1.979, F=93.964, P<0.05					
Nursing Care	Constant	15.635	0.980		7.709	(13.675-17.595)	<0.001
	Presence of Emergency Specialist	2.096	0.517	0.146	4.053	(1.081-3.111)	<0.001
	University	-1.788	0.508	-0.125	-3.522	(-2.784-0.791)	<0.001
	<i>Time-to-Provider</i>	-0.027	0.010	-0.098	-2.668	(-0.048-0.007)	0.008
	Type of Referral	1.540	0.610	0.091	2.526	(0.343-2.737)	0.012
	Age	0.027	0.011	0.082	2.314	(0.004-0.049)	0.021
	Coverage of Insurance	-1.566	0.781	-0.070	-1.992	(-3.089-0.022)	0.047
Model	R=0.778, R ² =0.606, Δ R ² =0.593, SE _E =12.877, F=46.193, P<0.05						
Diagnosis Proceedings	Constant	12.354	1.054		3.522	(10.246-14.462)	<0.001
	Presence of Emergency Specialist	1.097	0.362	0.110	3.030	(0.386-1.808)	0.003
	LOS	0.014	0.005	0.095	2.631	(0.004-0.024)	0.009
	Gender	-0.859	0.366	-0.085	-2.349	(-1.577-0.127)	0.019
Model	R=0.693, R ² =0.479, Δ R ² =0.472, SE _E =17.021, F=71.231, P<0.05						
Total Satisfaction	Constant	82.996	2.176		13.11	(78.644-87.348)	<0.001
	Presence of Emergency Specialist	8.734	1.446	0.209	6.038	(5.894-11.574)	<0.001
	Gender	-7.486	1.464	-0.177	-5.113	(-10.361-4.612)	<0.001
	University	-5.116	1.436	-0.122	-3.563	(-7.935-2.297)	<0.001
	Age	0.106	0.032	0.113	3.273	(0.043-0.170)	0.001
	Hometown	8.085	2.836	0.099	2.851	(2.518-13.653)	0.004
Type of Referral	3.587	1.720	0.037	2.086	(0.211-6.963)	0.037	
Model	R=0.603, R ² =0.363, Δ R ² =0.358, SE _E =7.940, F=62.120, P<0.05						

Discussion

Patient satisfaction has long been a challenge in ED. The aim of this research was to identify the effect of time-to-provider, left-without-treatment and length-of-stay on patient satisfaction in training hospitals.

The mean of time-to-provider was 18.1 minutes. The proportion of time-to-provider lower than 15 minutes was 92.8%. Time-to-provider affects satisfaction of these domains: admission, guardians, nursing care and managing proceedings. Despite an 11% increase in daily patient volume in 2010, analysis of time-to-provider pre-ED redesign and post-ED redesign implementation revealed a mean of 126.7 minutes in 2009 vs. a mean of 26.3 minutes in 2010 (11). Time-to-provider was 14 minutes (12). Arli et al. implied increasing period before first emergency intervention leads to dissatisfaction. The characteristic need of an ED patient is receive service within a short period. Managers must create policies and practices that allow emergency interventions to occur as soon as possible upon patient arrival (13).

The proportion of LWOT was 3.9%. LWOT do not affect patient satisfaction and its domains. The proportion of patients who left without treatment decreased. The proportion of LWOT during the 2009 study period was 8.7%, compared to 0.2% in the 2010 study period (11). More patients choose to leave ED without medical treatment (14). Left-without treatment rate was 5% during the study (12).

The mean of LOS was 202 minutes. The proportion of LOS lower than 6 hours was 90.3%. LOS affects satisfaction of these domains: diagnosis proceedings, admission and guardians. ALOS in 2009 was 5.5 hours and 3.6 hours in 2010, reflecting a mean reduction in ALOS of 1.9 hour (11). Colligan et al. reported length-of-stay was 238 minutes (12). The proportion of patients seen and treated within 4 hours improved from 83.9% to 96.3% (15). Adjusted total length-of-stay from 2003 to 2006 increased by 8.6 minutes for all patients. The introduction of a time target reduced the proportion of patients staying greater than 6 hours (15). Increased LOS has been associated

with negative outcomes such as decreased satisfaction (16).

This single study was initiated in response to specific issues concerning patient health care delivery such as time-to-provider, LWOT and LOS. The results must be cautiously generalized to other institutions.

Conclusion

Increasing time-to-provider and length-of-stay sometimes lead into dissatisfaction. But it doesn't often occur. Patients, who refer into ED of training hospitals, will to pay lower direct costs such as out-of-pocket or receive free services. They are aware that realizing this willingness requires into undergoing prolonged waiting times. Because they are enforced to pay more indirect costs such as waiting time. Therefore, this awareness could decrease patient dissatisfaction in some performance domains. On the other hand, Time-to-provider and LOS aren't exclusive contributory factors that could affect satisfaction of these domains. on the other hand, it is fault to exclusively considering to time factor in order to increase satisfaction. It is necessary to consider to other contributory factors, concurrently. Achieving patient satisfaction in various domains isn't only provided with decreasing LWOT, time-to-provider and LOS.

Ethical considerations

Ethical issues (including plagiarism, Informed Consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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