Research Article

Analysis Of Factors Influencing the Length of Stay of Patients in Emergency Department of a Private Hospital

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Abstract

Background: Emergency Department (ED) crowding, prolonged waiting time for care, patient dissatisfaction, adverse clinical outcome are well-known public health challenge globally. Timely understanding of the issue and resolving the same is paramount to efficient and effective healthcare delivery system. Healthcare organizations' failure to address these issues may end up with perceived lower quality of care, reputational damage due to poor patient outcome/experience.

Methods: A prospective observational study was conducted in an academic tertiary healthcare facility in UAE to to determine the factors influencing the length of stay in emergency department. Two hundred and twenty patients were recruited. Triaged patients data on registration, demographics, payment type, triage category, physician service time, radiology/laboratory services (if any), patient disposition time from ED or admission to in-patient unit were recorded using data collection tool.

Results: The length of stay in ED was less than an hour in 37.4%, between 1-2 hours in 34.6% and 2-3 hours or more in 14%. The mean duration of the stay was 102 minutes with a minimum of 7 minutes and a maximum of 581 minutes. The common factors perceived to prolong the ED stay were the triage category of patients, use of diagnostic imaging and laboratory services, the payment method and inpatient admission approval process.

Conclusion: Triage category, need for diagnostic services, admission approval and payment meth-od are independent variables which can influence the length of patient's stay in emergency department.

Keywords: Diagnostic service, Emergency service, Length of stay, Patient outcome, Triage

Introduction

Study Background

Emergency Department (ED) crowding, prolonged waiting for treatment, inpatient beds or transfer to another facility is a well-known public health problem. This ends up with patients leaving without treatment, poor patient experience and perceived lower quality of care. Delays in treatment may increase adverse clinical outcome with higher morbidity and mortality. For the hospitals it

leads to loss of revenue and image. Length of stay is a key measure of emergency department throughput and reflects the quality of care. Factors influencing the length of stay in ED are multifactorial and generally difficult to determine. Contributing factors could be external to the organization or outside the ambit of functioning of emergency department (*Babiche E. et al., 2018*). Identifying and understanding these factors with an in depth analysis is crucial for clinicians, hospital administrators and policy makers in developing strategic plans to improve patient flow in emergency department.

Review of Literature

Various studies have been undertaken worldwide to address this issue. *Happy I, et al.,* in 2019 [1] at Indonesia, *Osnat Bakshkin, et al.,* in 2015 [2] at Israel, *Babiche, et al.,* in 2018 at Netherlands and Irwan Juss in 2016 at North Jakarta conducted studies analyzing fac-tors contributing to length of stay in ED. *Happy I et al.,* (2019) [1] in their study analyzing the factors influencing the length of stay in ED observed that triage category of patient, need for specialist consultation, turnaround time for diagnostic investigations and need for admission significantly influenced the length of stay in ED. *Osnat Bashkin, et al.,* (2015) [2] observed that the prolonged length of stay in emergency department not only increases the health care operational cost but also can have significant effect on patient safety. *Babiche E, et al.,* (2018) [3] in their study to determine the root cause affecting the length of stay observed that the organizational factors outside the domain of emergency department played an important role. *Irwan Juss* (2016) [4] in similar study in Jakarta witnessed several factors contributing to prolonged stay in ED which are patient triage category, physicians and nurses' characteristics such as expertise and training are important independent variables. However as on date no such studies are reported from United Arab Emirates.

Objective of Study

To determine the factors influencing the length of stay in emergency department of a private hospital in UAE.

Methodology

Study Design

This study was prospective in nature and an observational study. The study was conducted in the emergency department of private teaching hospital in UAE for one month after obtaining necessary administrative approval form hospital authorities.

Study Population

Two hundred and twenty patients were recruited for the study.

Ethical Issues

None to be declared (Not applicable)

Inclusion & Exclusion Criteria

All patients attending ED seeking emergency care were included in the study except patients seeking critical care and emergency obstetric care (were excluded).

Study Intervention

On arrival these patients were triaged using Australian triage system. Key data were gathered by using modified data collection tool. Time of registration, patient demographics, payment type, triage category (triage category 2 to 5), physician service time, radiology/laboratory services (if any), patient disposition time – discharge from ED or admission to inpatient unit were recorded. The statistical analysis was done using SPSS software. Wilcoxon rank sum test and Kurskal Wallis test were utilized to analyze the data.

Results

The results of the study were analyzed using the below mentioned technique and tools. The statistical analysis was done using SPSS software. The data were not fol-lowing a normal distribution, hence nonparametric tests were used to analyze the data. The Wilcoxon rank sum test was used to test the difference in the location of two groups and the Kurskal Wallis test was used to test more than two groups. The level of significance was taken as P, =0.05.

Two hundred and twenty patients were included in the study. Of the total participants 65.5% patients were males and 34.5% were females (Tables 1,2).

The mean age of patients attending the emergency room was 32.9 years.

Table1: Distribution of participants with respect to their Gender (N=220).

Variable	Group	No.	%	Missing value
Gender	Male	144	65.5	No missing value
	Female	76	34.5	

Table 2: Central tendency and dispersion of Age.

Variable	Mean	SD	Minimum	Maximum	Range
Age	32.9	15.8	1	80	79

With regard to duration of stay, out of 220 patients there were 6 missing values. The duration of stay in emergency was less than an hour in 37.4%, between 1-2 hours in 34.6%. Only 14% of patients were in emergency for 2-3 hours or more. The mean duration of the stay observed was 102 minutes with a minimum of 7 minutes and a maximum of 581 minutes (9.6 hours) (Table 3). The possible reasons for the prolonged stay of patients were analyzed. Triage category, Payment methods of patient, radiological/laboratory investigations ordered, admissions ad-vised were analyzed.

Table 3: Duration of stay of patients in emergency department (N=220).

Variable	Group	No.	%	Missing value
Duration of Stay	<=60 minutes	80	37.4	6 missing value
	60-120 minutes	74	34.6	
	120-180 minutes	30	14.0	
	>=180	30	14.0	

Variable	Mean	SD	Minimum	Maximum	Range
Duration of stay	102.3	89.7	7.0	581.0	574.0

Mode of payment was insurance in 84.1% while remaining were self-paying patients. The mean duration of stay for insurance patients was 104.8 minutes whereas 88.9 minutes for self-pay patients. Patients with triage category 2 had a mean stay for 145.6 minutes compared to 29.8 minutes for category 5 patients (Table 4). Radiology investigations were asked for 15.5% of patients. Laboratory investigations were ordered for 38.3%. Admission was advised for 33.6 %. On comparing the duration of stay in ER with respect to triage category and service request for radiology, the mean stay with radiology request was 231.3 minutes and 146.9 minutes respectively for category 2 and 3 patients as against 123 minutes and 102.6 minutes without radiology request (Table 5).

Table 4: Comparison of duration of stay in ED with respect to payment method, gender and triage category (N=214).

Variable	Group	Mean	N	Std. Deviation	Minimum	Maximum	Median	P
Payment method	Insurance	104.8	180	94.3	7.0	581.0	78.0	
	Self	88.9	34	58.6	8	269	75	
Gender	Male	95.6	140	75.2	7.0	478.0	77.0	
	Female	114.9	74	111.6	8.0	581.0	79.0	
Triage category	2.00	145.6	48	109.8	14.0	575.0	121.0	<0.001
	3.00	110.1	105	87.2	12.0	581.0	85.0	
	4.00	64.9	43	48.5	10.0	219.0	55.0	
	5.00	29.8	18	18.9	7.0	77.0	24.5.0	

Table 5: Comparison of duration of stay in ED with respect to triage category and radiology service request.

Triage Category	Radiology Request	Mean	N	SD	Minimum	Maximum	Median	P
2.00	Yes	231.3	10	162.4	43	575	229	<0.05
	No	123	38	80	14	340	101	
3.00	Yes	146.9	18	89.6	38	347	139.5	<0.05
	No	102.6	87	85.2	12	581	79	
4.00	Yes	60.3	3	15.7	48	78	55	NS
	No	65.3	40	50.2	10	219	54	
5.00	Yes	25	1	--	25	25	25	NS
	No	30.1	17	19.4	7	77	24	

The time taken for various hospital services during visit to ED is analyzed. It is observed that the mean time spent for laboratory service was 185.6 minutes, radiology service was 203.3 minutes and 103.4 minutes for admission approval (Table 6). The time taken for these services with regards to the payment method is also analyzed. It is observed that the meantime taken for laboratory, radiology, and admission approval for insurance patients were 187.4 minutes, 230.7 minutes, 118 minutes respectively. It is 172.9 minutes, 87.8 minutes and 30.5 minutes respectively for self-paying patients (Table 7). The time taken for various hospital services during visit to ED was further analyzed based on triage category. In category 2 patients mean time taken for laboratory, radiology, and admission approval was 225.1 minutes, 228.8 minutes and 109.3 minutes respectively. It was 174.5 minutes, 193.2 minutes, and 97.1 minute for category 3 patients. The mean time was 141.6 minutes, 161.8 minutes and 94 minutes for category 4 patients (Table 8).

Table 6: Comparison of time taken for laboratory, radiology service and admission approval.

Variable	Mean	N	Std. Deviation	Minimum	Maximum	Median
Time taken for lab report	185.6	82	192.3	22.8	1020.6	133.5
Time taken for Radiology report	203.3	26	281.1	12	1273.8	103.5
Time taken for Approval	103.4	72	189.8	0	1438.2	64.5

Table 7: Comparison of time taken for Laboratory, Radiology service, admission approval with payment method.

Variable	Group	Mean	N	Std. Deviation	Minimum	Maximum	Median	P value
Time taken for lab report	Insurance	187.4	72	204.6	22.8	1020.6	128.1	NS
	Self	172.9	10	48.9	67.2	236.4	172.2	
Time taken for Radiology report	Insurance	230.7	21	307.3	12	1273.8	105	<0.05
	Self	87.8	5	31.6	46.8	129.6	87.6	
Time taken for Approval	Insurance	118	60	204.7	1.8	1438.2	73.5	<0.01
	Self	30.5	12	27.6	0	71.4	25.8	

Table 8: Comparison of duration of stay in ED with respect to triage category and medical service.

Triage Category		Time Taken Lab Report	Time Taken Radiology Report	Time Taken Admission Approval	P Value
2	Mean	225.1	228.8	109.3	NS
	N	24	10	38	
	Std. Deviation	240.5	269.4	228.5	
	Median	167.7	89.7	65.4	
	Minimum	22.8	12	0	
	Maximum	1020.6	762.6	1438.2	
3	Mean	174.5	193.2	97.1	NS
	N	46	13	31	
	Std. Deviation	184.4	329.4	143.9	
	Median	127.2	87.6	59.4	
	Minimum	45	46.8	0	
	Maximum	872.4	1273.8	795	

	Mean	141.6	161.8	94	NS
	N	11	3	3	
	Std. Deviation	83.6	56.8	27.1	
4	Median	129	129.6	83.4	
	Minimum	52.2	128.4	73.8	
	Maximum	368.4	227.4	124.8	

Discussion

Review of study observations revealed that males constituted two thirds of study population and the gender had no bearing on the length of stay in ED. The mean duration of ED stay observed in our study was 102 minutes. More than two third (72%) of patients had a length of stay less than 2 hours however the maximum stay was for 9.6 hours. The common factors perceived to prolong the ED stay were the triage category of patients, use of diagnostic imaging and laboratory services, the payment method and in-patient admission approval process. On analyzing the above factors contributing to the length of stay it is observed that the triage category 2 had significantly increased duration of ED stay compared to other triage category (p <0.001). Over all the method of payment for availing the service was found to be insignificant contributing to length of stay. On analyzing the impact of request for radiology services (among patients of various triage category) over the length of stay it is clear that the patients with Category 2 and category 3 had a significant influence in increasing the duration of stay in ED (p <0.05). Length of stay almost doubled for category 2 patients compared to patients without such request (231 minutes verses 123 minutes). In Category 3 patients the du-ration increased by almost one and half times (147 minutes verses 103 minutes).

The impact of other factors which may affect the length of stay like laboratory service and admission approval were assessed. On comparing the three services of radiology, laboratory and admission approval it is observed that the radiology service contributed maximum for increasing the length of stay compared to laboratory and admission approval time in the descending order. On reviewing the impact of payment method in relation to the three hospital services (Radiology, laboratory and admission approval) contributing to length of stay it is seen that there is a significant increase in length of stay for insurance patients with radiology service request (p <0.05) and admission approval (p <0.01) compared to self-pay.

The major contributors for prolonged ED stay as per our study were patients with low-er triage order (Triage 2 and 3), use of diagnostic imaging and patients requiring ad-mission. Laboratory tests was also associated with longer stay but varied with specific tests ordered. Insurance patients positively influenced the length of stay of patients specifically with radiology service and admission approval segments. The findings of our study was similar to the observations witnessed in another study by *Yoon P, et al.,* (2003) [5]. Yoon also observed longer stay in triage 3 and 4 category. In our study category 4 patients did not show an increase in length of stay which could be attributed to our practice in ED. Triage 4 and 5 patients are generally stable patients who are treated symptomatically in our ED and then given an option to wait for reports or to follow up later with the reports. The patients in lower triage category (2 and 3) are usually sick requiring further urgent diagnostic work up for patient care.

Limitation and Future Direction

Needs future studies with larger sample size exploring corporate/non-teaching healthcare organizations to understand the related other dimension of this clinical domain.

Conclusion

Triage category, need for diagnostic services, admission approval and payment method are independent variables which can influence the length of patient's stay in emergency department. This study facilitated in understanding the most significant and influential factors affecting the length of stay in emergency department of private hospitals in UAE. It is expected to guide the policy makers in developing strategic plans to improve patient journey in emergency department.

Acknowledgement

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Conflict of Interest

None.

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