RESEARCH ARTICLE

Understanding health service quality in emergency department through the length of stay and its determinants

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Abstract

Objective: To identify and analyse the determinants of emergency department length of stay.

Method: The cross-sectional study was conducted from December 20 to 31, 2017, at the Centre of Referral Hospital after approval from the ethics review committee of Dr Soetomo General Hospital, Surabaya, Indonesia, and comprised patients of either gender aged 18 years or above who visited the emergency department who required follow-up after triage, such as diagnostics or hospitalisation. Emergency department length of stay, assessment time, review and consultation, and disposition or decision were the variables noted. Data was analysed using SPSS 18.

Results: Of the 172 patients, 95(57%) were men and 74(43%) were women. The largest age group was of those aged 45-59 years 61(34.4%). There were 48(27%) cases of surgery and 124(73%) of medicine. Mean emergency department length of stay was 575.94±306.402 minutes (range: 100-2215 minutes), and it was significantly associated with assessment time (*p*=0.001), review and consultation time (p=0.001) and disposition or decision time (p=0.002).

Conclusion: The emergency department length of stay was found to be rather prolonged and needed to be improved.

Keywords: Healthcare quality, Emergency department, Length of stay, Timeframe guide model of care.

(JPMA 73: S-30 [Suppl. 2]; 2023) **DOI: https://doi.org/10.47391/JPMA.Ind-S2-7**

Introduction

Length of stay (LOS) in emergency department (ED) is an important indicator of quality of healthcare and service in a hospital in addition to the good communication between healthcare workers and patients.[1] Prolonged emergency department length of stay (EDLOS) is related to ED crowding, increased cost and negative patient outcomes.[2-5] A preliminary study in a referral centre hospital in East Indonesia showed that approximately 47.2% patients spent more than 6 hours in the ED, 28.1% >12 hours, and 5.1% died within the treatment period.[6]

Crowding in ED has, over a period of two decades, become a global issue in the healthcare system. ED crowding itself can lead to an increase in unexpected events, service delays, mortality and hospital LOS. As such, it is crucial to resolve the issue of ED crowding.[2,7] The causes of ED crowding can be divided into three factors: input, throughput and output.[8] Input and output factors are wider health issues that involve external aspects and hospital policy. The throughput process focusses on patient flow and the achievement of predetermined time targets. Based on the Time Frame Guide Emergency Model of Care, the maximum duration for throughput process is 4 hours, which is divided into three timeframes.[9] The first starts from the time of arrival at the ED (registration), followed by triage/sorting of patients based on their acuity level, conducting the assessment (initial examination and support diagnostic), as well as designing a clinical management plan. The second timeframe is the duration of medical review and consultation. In this time, the patient is reviewed by specialist teams, and consultations are made, and it ends before the dispositions or decision by the doctors. The third timeframe is related to the duration of disposition or decision made by doctors, including the waiting time for the transfer of a patient out of ED to be admitted, surgery, or other specific procedures.[8,9] Any delays in the throughput process can potentially lead to ED crowding and cause prolonged LOS. The current study was planned to identify and analyse the determinant of EDLOS in an urban setting.

Patients and methods

The analytical, descriptive, cross-sectional study was conducted from December 20 to 31, 2017, at the Centre of Referral Hospital after approval from the ethics review committee of Dr Soetomo General Hospital, Surabaya, Indonesia. The sample was raised using consecutive sampling technique. Those included were patients of either gender aged 18 years and older, who had yellow, red or blue label during triage based on the Australian Triage Scale[10,11], and required further action, such as diagnosis or hospitalisation, and were not death on arrival (DOA) or death after arrival (DAA) cases. Those with incomplete documents or unwilling to participate were excluded. Informed consent was obtained from the patients.

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Assessment of LOS began from the arrival time of each patient in the triage room to the time of in-patient decision. The Emergency Department Wait Time Indicator Calculation Toolkit of the Canadian Institute for Health Information was used for the purpose.[12]

The observation sheet had a column where assessment time was noted starting from registration date/time (including triage), followed by physician's initial assesment time (including diagnostic examination time). The review and consultation time was measured at the end of diagnostic examination time to the time of initiation of disposition or decision time. Lastly, the disposition or decision time was measured from the time the disposition or decision was made to the time the patient left the ED for the in-patient or special care unit. Length of stay was measured by the total duration of registration time to transfer time.

The digital clock in the emergency room was used as a reference for all patient observations minute by minute.

Data was analysed using SPSS 18. Descriptive statistics were performed using frequencies and percentages for categorical variables, while mean and standard deviation values were used for numerical variables. Multiple logistic regression was used for the primary data. The level of statistical significance was set as $p<0.05$.

Results

Of the 172 patients, 95(57%) were men and 74(43%) were women. The largest age group was of those aged 45-59 years 61(34.4%). There were 48(27%) cases of surgery and 124(73%) of medicine (Table 1).

Table-1: Patient characteristics (n = 172).

No	Characteristics	participants n (%)
1	**Gender**	
a.	Male	98 (57)
b.	Female	74 (43)
2	**Age** (years)	
a.	18- 24	12 (7)
b.	25- 44	44 (25.6)
c.	45- 59	61 (35.4)
d.	≥ 60	44 (32)
3	**Triage Label**	
a.	Yellow	8 (4.6)
b.	Red	158 (91.9)
c.	Blue	6 (3.5)
4	**The Way of Arrival**	
a.	Come Alone	26 (15.1)
b.	Outside referrals	71 (41.3)
c.	Referral in	75 (43.6)
5	**Case Type**	
a.	Surgery	48 (27)
b.	Medical	124 (73)

Table 2: Throughput time and emergency department length of stay (EDLOS) (n = 172)**.**

Variables	mean±SD (minutes)	Min – Max (minutes)	Logistic Regression (*ρ* value)	Exp(B)
Throughput time				
1 Assessment time	186.52 ± 91.745	40 - 497	0.001	6.070
2 Review and	254.97 ± 235.052	4 - 1145	0.000	34.767
Consultation time				
3 Transfer time	134.45 ± 117.802	10 - 1005	0.002	5.271
ED length of stay	575.94 ± 306.402	100 - 2215	-	-

SD: Standard deviation.

Table-3 Distribution of of throughput time and emergency department length of stay (EDLOS) (n = 172).

No	Observation time	Participants [n (%)]
1	**Throughput time**	
	1) Assessment Time	
	a. < 2 hours	41 (23.8)
	b. ≥ 2 hours	131 (76.2)
	2) Review time	
	a. < 1 hour	30 (17.4)
	b. ≥ 1 hour	142 (82.6)
	3) Transfer time	
	a. < 1 hour	32 (18.6)
	b. ≥ 1 hour	140 (81.4)
2	**Length of stay (LOS)**	
	a. < 4 hours	14 (8.1)
	b. 4- < 6 hours	29 (16.9)
	c. 6- 8 hour	35 (20.4)
	d. > 8 hours	94 (54.6)

Mean EDLOS was 575.94±306.402 minutes (range: 100-2215 minutes), and it was significantly associated with assessment time (p=0.001), review and consultation time (p=0.001) and disposition or decision time (p=0.002) (Table 2).

EDLOS was >8hours in 94(54.6%) cases, assessment time was >2 hours in 131(76.2%) cases, review time was >1 hour in 142(82.6) cases and transfer time was >1 hour in 140(81.4%) cases (Table 3).

Discussion

There was a significant relationship between all the three variables of throughput time and EDLOS, indicating that consultation time, laboratory examination time, radiological examination time, and physical disposition time impact EDLOS.[13] The three indicators or variables showed an extended time, which means that they are still under the standard emergency model of care.[14] Since the current study was limited to only measuring the frame time in general, and did not identify for each part or activities,

such as arrival time, triage time or examination (physical and laboratory), it was not possible to carry out further analysis as to which part contributed the most to a prolonged assessment time.

The review and consultation process proved to be significant, dominantly affecting the throughput time. This differs from existing studies that found assessment time as the dominant timeframe.[13] This condition occurred due to the gradual consultation process that the physician must perform before establishing a diagnosis, and determining the disposition of the patient. The gradual process occurred because study site was a teaching hospital, and demands a supervisor in every decision-making process. An extension to the review and consultation process also occurred due to general progress and the correction of laboratory results up to their completion in the ED. General improvements and corrections of laboratory results should be made in the in-patient room.

The results of the assessment timeframe were also found to be prolonged. Assessment was extended due to laboratory check-up times that did not match the deadlines. This can be observed from the standard of laboratory examination services, completed in <2 hours. The extension of the assessment time was similar to those in existing studies.[15,16] The assessment process in the current study took 3 hours to complete. It could have been caused by the inadequate ratio of health workers and patients that lead to overload, as is the case in many hospitals in Indonesia.[17-19]

The average waiting time for patient transfer to the in-patient unit from the disposition by the doctor was also found to be extended. This may have been due to a variety of factors. One of these being the administrative process, where the doctor and nurse need to complete the patient's hospitalisation process. In addition, the surgery rooms are typically occupied and there is no available bed for patients in the ED. There was also not sufficient equipment, like a ventilator. This situation had already been anticipated by the ED management, which provided a special transit space. This action is in accordance with existing literature stating that hospital facilities are generally very supportive in terms of providing good service, especially in terms of achieving LOS targets.[17,20-22]

The national standard EDLOS target in Indonesia is 8 hours.[23] The mean EDLOS were extended in the current study, with more than half (54.6%) experiencing EDLOS >8 hours. The target EDLOS is not specified in detail for each time. This condition desperately requires nurses with critical mindsets to overcome obstacles in order to achieve EDLOS target.[24]

The EDLOS between different patients varied in scope, indicating that overcrowding remains a complex problem. The current findings offer potential explanations for the differences between the institutional ED and standard national standards. Studies have shown different EDLOS in particular institutions.[21,25,26]

Conclusion

Assessment time, review and consultation time, and transfer time had a significant relationship with EDLOS. Review and consultation times were the dominant factors that affected EDLOS.

Acknowledgment: We are grateful to all the individuals, nurses and hospital staff involved in the study.

Disclaimer: The text was presented as an Abstract at the 13th International Nursing Conference of the Faculty of Nursing, Universitas Airlangga, Indonesia, in 2022.

Conflict of Interest: None.

Soource of Funding: None.

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