

# Factors Influencing the Patients' Length of Stay in a Tertiary Hospital Emergency Department

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## Abstract

The patients' length of stay in the ED effect on many things, such as to the cost of treatment, patient safety, quality of care and patient satisfaction. Because of these reasons, managing emergency services of patients remain at the standard of service specified time, which is 8 hours, becomes important. The purpose of this study was to analyze the factors that affect Length Of Stay patient in the IGD RSHS. The analysis by multiple linear regression method found that age, gender, the number of diagnostic examinations, the number of consultation and triage category affect significantly ( $p < 0.05$ ) on LOS. Number of diagnostic examinations is the most influential factor.

**Keywords:** IGD, Length of Stay, Number of diagnostic examinations

## 1. Introduction

Length of Stay (LOS) is the length of a patient is in the emergency department before being discharged, treated or died. Joint Commission International (JCI) set boarding time for 4 hours in the ED. Although this time is not a vote but JCI standards make it as a reference for hospital institution to set a logical standards in accordance with the conditions of each hospital (JCI 2013). In Indonesia, the Ministry of Health set a time of observation in the emergency room before being transferred to hospitalization for no more than 8 hours. These standards are listed in Permenkes RI No. 129 tahun 2008 about Standar Pelayanan Minimal Rumah Sakit.

Various studies have been done overseas to identify the factors that affect LOS patient in the ED. Herring study found that the greatest contribution to the LOS derived from the use of advanced diagnostic tests such as ultrasound, CT scan and MRI (Herring, Wilper et al. 2009: 609-616). According to Krall in his research, that there are many factors that influence ED patients' LOS, and management systems of hospital resources contribute more to the patients' LOS than a clinical problem (Krall, Cornelius et al. 2014: 158-164). Brouns doing research at a teaching hospital in the Netherlands and found that organizational factors such as the number of consultations, diagnostic examinations and seniority of clinician personnel contributed to the prolonged ED LOS than medical factors (Brouns, Stassen et al. 2015: e0135066). In a study conducted by Bashkin, it was found that the most decisive factor in the elongation of ED LOS turn to be doctors and nurses changing shifts. A shift change often lead to miscommunication that resulted in delays in decision-making (Bashkin, Caspi et al. 2015: 38). A similar study carried out in France and found that there are three factors associated with ED LOS, the patient's age, severity of illness (CCEP Level), and the

number of ED visits (Capuano, Lot et al. 2015: 92-98). Chaou doing research in a tertiary hospital in Taiwan and found that age, higher triage level (triage level 1 compared with triage level V), the nontrauma case in children (compared with the nontrauma case in adults), and the visit time during the day (compared to the time of the visit in the evening) was associated with a longer LOS in the group of discharged patients (Chaou, Chiu et al. 2016: e3263). Gerbeaux and Lammers conducted two different studies in terms of time and place, but both found similar results, examination by resident or medical student extended the ED LOS (Gerbeaux, Ledoray et al. 2001: 275-278, Lammers, Roiger et al. 2003: 725-730).

In January 2017, the ED LOS for discharged adult patients, the fastest was 30 minutes and the longest was 45 hours and 50 minutes. For hospitalized adult patients, the fastest is 2 hours 58 minutes while the longest was 39 hours 56 minutes. As for adult patients who went into intensive care, the fastest LOS was 7 hours 15 minutes and the longest was 16 hours 44 minutes. In pediatric cases, for discharged pediatric patients, the fastest LOS is 5 hours 55 minutes, the longest is 195 hours 54 minutes. For pediatric patients who were hospitalized, the fastest LOS was 3 hours 27 minutes and LOS longest was 111 hours. For pediatric patients who need intensive care, the fastest LOS was 48 hours 11 minutes, while the longest was 97 hours and 18 minutes.

Based on the introduction above, the problem in this research is as follows, what are the factors that affect the patients' length of stay of in emergency department of Dr. Hasan Sadikin?

The purpose of this study was to analyze the factors (age, number of diagnostic examinations, day and time of arrival, triage category, referrals and the number of consultations) that influence the patient's

length of stay in the emergency department of Dr. Hasan Sadikin

## 2. Literature Review

### Length of Stay (LOS)

Length of stay (LOS) is the length of time a patients stay in the ED. It is calculated starting from the registration of patients in the ED until the patient leaves the ED, could be due to the hospitalisation or to operating room for surgery, discharge, forcible return or die (Rathlev, Chessare et al. 2007: 265-271, Herring, Wilper et al. 2009: 609-616, Fee, Burstin et al. 2012: 476-482, Kawano, Nishiyama et al. 2014).

Length of stay is often used as a standard assessment of hospital efficiency because when the other factors are assumed to be constant, then reduce the LOS will reduce maintenance costs, and vice versa.

### Factors Affecting ED LOS

Various attempts have been made to overcome this problem, such as by conducting research to identify the factors that are considered related to or affect the LOS of patients in the ED. These factors include: Age

In the study conducted by Chaou et al. found that increasing age of the patient associated with a longer LOS. Even after the effect of the level of triage, diagnostic examination and consultation be controlled, the age still shows significant effects (Chaou, Chen et al. 2017: e0165756). Brouns et al. research found that LOS in elderly patients is 30 minutes longer than younger patients. The impact of organizational factors such as the number of consultations, diagnostic examinations and seniority of doctors appear more clearly in the group of elderly patients than in younger patients group (Brouns, Stassen et al. 2015: e0135066).

### Diagnostic examination

In the study conducted by Herring et al., Brouns et al. and Chaou et al., they found similar result that when an advanced radiological examination were carried out it will extend ED LOS than patients who did not have advanced radiology examination (Herring, Wilper et al. 2009: 609-616, Brouns, Stassen et al. 2015: e0135066). Research conducted by Park et al. show that the use of bedside ultrasonography may reduce LOS significantly (Park, Jung et al. 2016: 197-203). Results of research Jang et al. showed that laboratory tests in point-of-care test (analysis performed at the sampling location, ie at IGD) can reduce the LOS (Jang, Shin et al. 2013: 145-151).

### Triage Level

Eva Marti’s research at a hospital in Yogyakarta concluded that the higher the level of triage, the longer patients’ LOS (Marti 2016: 99-103). This results are consistent with Chaou et al. which states that a higher triage level (Level I compared with Level V, Level II compared with Level V) will extend the LOS in the discharged patient (Chaou, Chiu et al.

2016: e3263, Chaou, Chen et al. 2017: e0165756). Research conducted by Capuano et al. in French give similar results. The results of this study concluded that the ED LOS will be longer in patients with higher CCEP (Capuano, Lot et al. 2015: 92-98). In Brouns’ research, triage level with high urgency level has a significant relationship to shorter ED LOS in elderly patients (Brouns, Stassen et al. 2015: e0135066).

### Number of Consultation

Consultation among departments is a common thing to do in the ED, especially in tertiary hospitals, where the consultation can be twice more from the district hospital (Rene S Lee 2008: 4-9). Mahsanlar et al. research results stated that 43.4% of patients require one consultation and has an average LOS for 397 minutes (Mahsanlar, Parlak et al. 2014: 3-8). In Brouns et al. research, consultations > 1 had a significant association with prolonged ED LOS (Brouns, Stassen et al. 2015: e0135066). Research by Chaou et al., gives similar results. Consultation is one of the factors that prolonged LOS (Chaou, Chen et al. 2017: e0165756).

### Ministry of Health ED Services Standard

There are several terms of service time are known in the ED, namely:

#### Decision Times

Is the span of time between the patient registration until get a decision for treatment, surgery, or discharged. Decision Times set ≤ 2 hours (RSHS 2017).

#### Observation Times

Is the span of observation time of patients in the ED, which is calculated from the decision times until the patients out of the ED. Observation Times set ≤ 6 hours (RSHS 2017).

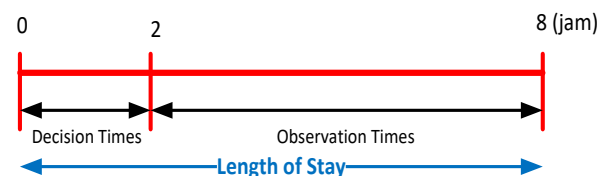


Figure 1 Illustration of Hours of Service on IGD RSHS

Table 1 Minimum ED Service Standards (Indonesia 2008)	
INDICATOR	STANDARD
The ability to handle life saving in children and adults	100%
Opening hours emergency services	24 hours
Emergency service providers are certified valid BLS / PPGD / GELS / ALS	100%
Availability of disaster response team	One team
Response time in emergency medical service	≤ 5 minutes after the patient arrives
Customer satisfaction	≥ 70%
Mortality Rate <24 hours	≤ two per thousand
Especially for the mental hospital patients can be soothed in time ≤ 48 hours	(moved to inpatient services after 8 hours)
Absence of patients are required to pay in advance	100%
	100%

### Hypotheses

Based on the explanation above, the authors put a hypothesis as follows:

Age, number of diagnostic examinations, day and time of arrival of the patient, the number of consultations, triage levels and referral affect the LOS of patients in the emergency department of Dr. Hasan Sadikin.

### 3. Research Methods

The method of this research is analytic cross sectional design using secondary data, such as daily and monthly emergency services reports, both computerized and recorded manually in a patient

registry books in every procedure room. This research also used data derived from the Hospital Information System (SIRS) of Dr. Hasan Sadikin hospital. Sampling was done by total sampling method. Emergency department patients who entered the period 1 May - June 30, 2017 will be selected as a research subject. The inclusion criteria are, all patients recorded in the RSHS ED procedure room except Obgyn and all patients who had a complete medical record. Exclusion criteria are patients without identity, DOA patient, forced return and transfer of care, infant, infectious patients, as well as patients who fail treatment. Variable to be studied, described in the table below.

Variables	Concept	Size	Measurement	Scale
Age	Calculated as follows: date of arrival to the ER reduced birth date	Year	The calculation results Group : 1-18 years; > 18-59 years; ≥60 years	interval
Number of diagnostic examinations	How many times a patient is registered to conduct examination, namely: Radiology (X-Ray = 1, USG = 1, CT-Scan = 1), Laboratory (Blood and Urine = 1, AGD = 1), ECG = 1	Time	The calculation results	ordinal
Triage Category	Category emergency triage patients based on valid votes in the ED RSHS	Category I - V	Physical examination Group: Categories I, II, III, and IV	ordinal
Number of consultation	The number of consultations between SMF performed in one patient handling process	item	The calculation results	ordinal
Length of stay	The duration of the patient is in the emergency room. Calculated from the clock patient registers until the patient out of the ED	Minute	The calculation results	numerical

In bivariable analysis Mann-Whitney and Kruskal-Wallis were used because the data distribution was not normal. Spearman's test was used to test the numerical independent variable correlation. The analytical method used in the multivariable analysis is linear regression test (Ghozali 2013, Dahlan 2014). All statistical tests using IBM software SPSS version 20 for Windows operating systems with a significance level of 5%.

### 4. Results and Discussion

During the study period, which lasted from May 1st,

2017, until June 30th, 2017, 4,853 patients were treated at Hasan Sadikin Hospital emergency department. As much as 3,037 patients met the inclusion criteria but 642 patients should be excluded so that a total of 2,395 patients are observed.

The results of normality tests showed that numeric variables are not normally distributed so that presented as the median, minimum and maximum values as shown in the table below.

statistical					
Numerical variables	n	median	Minimum	Maximum	distribution Data
LOS (minutes) Age (years) Number of diagnostic examinations	2395 2395 2395	511 43 4	10 n1 0	9580 110 35	Abnormal Abnormal Abnormal

In this study, LOS range is extremely long, minimum is 10 minutes and a maximum of 9580 minutes or about 160 hours (6 days 14 hours). The median value of the LOS is 511 minutes or 8 hours 31 minutes.

Distribution of the number of diagnostic examination of the study are shown in the following figure.

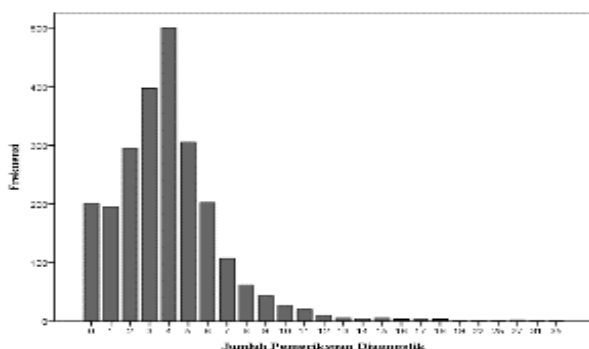


Figure II Distribution of Total Diagnostic

Based on the chart above we can see that the highest frequency of diagnostic examination is 4 times, as many as 500 patients. Furthermore, the frequency decreases with increasing number of diagnostic examinations.

Next will be shown graphic of grouping in the ED LOS RSHS.

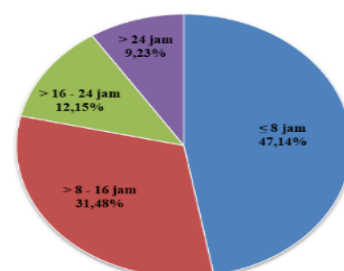


Figure III Distribution of ED LOS at Hasan Sadikin Hospital

Based on the above chart we can see that if the LOS grouped per 8 hours then 47, 14% has reached the standard set by the Ministry of Health. While 52.86% still exceeds the standard time. Even 9.23% of them had more than 24 hours

subjects that include gender, age group, how to pay, triage category, Doctors Responsible Care (DPJP), the number of consultations, the day of arrival, time of arrival, the origin of a referral, and outcomes in Table IV below.

Next are shown the basic characteristics of research

Table IV Basic Characteristics of Research Subjects	
Categorical variables, the frequency (%)	n = 2395
Gender Man Perempuan	1,358 (56.7) 1,037 (43.3)
Age group 1-18 years 19-59 years ≥ 60 years	452 (18.9) 1,423 (59.4) 520 (21.7)
Payment Method PBI and JAMKESNAS Non PBI General Contractor Social Security	357 (14.9) 1,262 (52.7) 644 (26.9) 101 (4.2) 31 (1.3)
Triage Category Category 1 Category 2 Category 3 Category 4	76 (3.2) 433 (18.1) 1,539 (64.3) 347 (14.5)
DPJP specialist 1 specialist 2	1,169 (48.8) 1,226 (51.2)
Total Consultation 0 1 2 or more	1,910 (79.7) 391 (16.3) 94 (3.9)
Arrival day Working days Day off	1,548 (64.6) 847 (35.4)
Time of arrival Morning Shift Afternoon Shift Night shift	732 (30.6) 944 (39.4) 719 (30.0)
Origin of Referral Public Hospitals Private hospitals PHC Doctor without Referral	484 (20.2) 440 (18.4) 25 (1.0) 176 (7.3) 1,270 (53.0)
Endpoint Discharged Hospitalisation Intensive Care Operation Died	614 (25.6) 1,227 (51.2) 221 (9.2) 205 (8.6) 128 (5.3)

By sex, as many as 1,358 (56, 7%) study subjects were male. We also see that the largest proportion of the research subjects are in the adult age groups (19-59 years). Based on payment method, 52, 7% of patients use Non PBI payment method. As much as 64, 3% of patients treated were triage Category 3. In this study, 1,162 patients managed by DPJP who were specialist 1 and 1,226 patients managed by DPJP specialist 2. Number of consultation ranges from 0 (not consulted to other SMF) to 4 consultations to another SMF. The result is 79, 7% of patients in this study was not consulted to other SMF. More patients visit ED on weekdays than on day off, which amounted to 64, 6% and it can be seen that the patient visit almost evenly on each shift, and there was a slight increase in the afternoon shift, i.e 39,4%. Based on referral, 53% of patients come to ED without a referral. Meanwhile, based on the endpoint of patients, 51, 2% of ED patients required regular care in ward and 25,6% of patients can be discharged after treatment.

### Bivariable Analysis

Table V Correlation Between Variables Numerical Against LOS		
numeric variables	Spearman correlation coefficients	p-value
Age	-0.07	0,001
Number of diagnostic examinations	0.52	<0.001

The age coefficient value shows a negative correlation and the strength of correlation is very weak but from the p-value then this correlation remained significant. A negative result indicates that the increasing age will actually shorten the LOS. As for number of diagnostic examinations variable, coefficient values indicate a positive correlation with moderate correlation strength. This result means that, each additional diagnostic examination will prolong LOS. Statistically it can be concluded that age and diagnostic examination had significant correlation with LOS.

Table VI Bivariable Analysis For Categorical Variables		
Categorical Variables	LOS	p-value
Gender Man woman	489 (10, 8489) 544 (12, 9580)	0,010 #
Age group 1-18 years 19-59 years ≥ 60 years	552 (17, 9580) 511 (10, 7320) 474 (13, 6987)	0,014 \$
Total Consultation 0 1 2 or more	437 (10, 9580) 812 (65, 5574) 1092 (103, 5760)	<0,001 \$
Triage Category Category 1 Category 2 Category 3 Category 4	223 (12, 9580) 653 (10, 8489) 569 (15, 7320) 235 (20, 2289)	<0,001 \$
Arrival day Working days Weekends and public holidays	532 (10, 8489) 471 (18, 9580)	<0.001 #

#Mann-Whitney test; \$ Kruskal-Wallis test

Results of the bivariable analysis showed that the variables gender, age group, the number of consultations, triage category, are having significant relationships on LOS.

### Multivariable analysis

To meet the assumptions of linear regression, data were transformed using the natural logarithm (logarithm base of natural numbers).

Table VII Multivariable Analysis				
Effect	Regression coefficient	SE	t	p-value
constants	4.922	0.091	53.890	<0.001
Age	-0.006	0.001	-8.750	<0.001
Gender (male vs. female)	-0.073	0.029	-2.506	0,012
Triage category (2 vs 1)	0.694	0.088	7.898	<0.001
Triage category (3 vs 1)	0.936	0.082	11,400	<0.001
Triage category (4 vs 1)	0.454	.090	5,071	<0.001
Consultation (1 vs 0)	0.391	0,040	9.693	<0.001
Consultation (≥ 2 vs 0)	0.455	0,076	5.982	<0.001
Number of diagnostic exam.	0,144	0,006	25.512	<0.001
SE = standard error; F (9.2385) = 178.06; Adjusted-R2 = 0.40				

Of all the variables, the variable number of the diagnostic test has the greatest value of t (t = 25,512), followed by triage category and number of consultations. Obtained from multivariable analysis adjusted-R2 value of 0,40, which means that the 5 variables above can explain the LOS by 40%.

Gender variable has a negative  $\beta$  value (-0.073). This suggests that male patients has a shorter LOS compared with female patients. Variable number of diagnostic examinations have value  $\beta = 0,144$  it can be concluded that each 10 additional diagnostic

examination will increase LOS in logarithmic scales at 0,144 minutes. Something similar has been found in studies conducted by Herring et al., Brouns et al., And Chaou et al. In Kawano research even states that the diagnostic test more influential than other factors LOS (Takahisa Kawano, Kei Nishiyama et al. 2014).

Interaction between independent variables were examined. Of several analyzes conducted a significant interaction was found as shown in the following table.

**Table 4.7. Interaction Analysis Between Variables**

Effect	The regression coefficient	SE	t	The p-value
constants	5.462	0.176	30.984	<0.001
Age	-0.018	0,004	-5.187	<0.001
Gender	-0.076	0,029	-2.615	0.009
Triage category (2 vs 1)	0.087	0.186	0,467	.640
Triage category (3 vs 1)	0,408	0.174	2,344	0,019
Triage category (4 vs 1)	-0.123	0.185	-0.661	0,509
Consulting (1 vs 0)	0,392	0,040	9.738	<0.001
Consulting ( $\geq 2$ vs 0)	0,462	0.076	6,073	<0.001
Total inspection Age-Triage Category 2 Age-Triage Category 3 Age-Triage Category 4	0.143 0,014 0,012 0,014	0,006 0,004 0,004 0,004	24.457 3,718 3,429 3.516	<0.001 <0.001 0,001 <0.001

SE = standard error; F (12.2382) = 135.400; Adjusted-R2 = 0.403

It can be seen that there is an interaction between the variables of age and triage category (p <0.001) with adjusted-R2 of 0.403.

The next variable that has a major influence on LOS is triage category. Patients with category 1 (Resuscitation/Handling Soon) had the shortest median LOS compared to other categories. This is in line with the results of Chaou et al. and Brouns et al. which stating that the more critical patients had a shorter LOS compared to other patients despite different triage assessment systems (Brouns, Stassen et al. 2015: e0135066, Chaou, Chiu et al. 2016: e3263). These results are in contrast to studies conducted by Herring et al. and Capuano et al. In their study a longer LOS was found in critical condition (Herring, Wilper et al. 2009: 609-616, Capuano, Lot et al. 2015: 92-98). The difference can occur due to several reasons. First, as the tertiary hospital referral center, RSHS, especially the ED, are accustomed to handling a complicated emergency cases so the case management and ED personels has understand their respective duties. Second, patients in first category are patients who are in critical condition and in need of resuscitation so that decision-making by the medical team can be done quickly. Third, Hasan Sadikin Hospital has 39 beds for intensive care and 84 beds for high-care nursing. This amount is quite a lot when compared with the total study subjects who require intensive care and high care, as many as 221 patients, or about 1 Beds: 2 patients.

There is a possibility that there are patients who have extended ED LOS due to intensive care inavailability, such as pediatric patients, given the capacity of the NICU and PICU only 14 beds. The hospital management, especially inpatient ward management, should be able to draw up priority criteria for patients requiring intensive care,

strengthening cooperation with other hospitals to refer back or even transfer the patient to another hospital that has the facilities needed by patients. The critical care without wall is currently being a new trend, which simply means that the critical care experts extend their services beyond the ICU and actively involved in the strategic management of patients, anywhere in the hospital, which was considered requiring the handling of critical care from the start. It can decrease morbidity and mortality. It is even said that 41% of intensive care can be prevented with the right early treatment (McQuillan 1998: 1853-1858, Hillman 2002: 594-599).

In this study, the number of consultations is one of the variables that affect LOS. Although the results of the study states that 79,7% of patients in the ED RSHS not consulted but in reality patients in this group will still be consulted internally in the department, which is between the junior resident to senior residents and senior residents to DPJP, or consult between subdivisions within the same department. This type of consultation is often not being recorded in the medical record which is the research source of secondary data. Internal consult still caused prolonged LOS because consultation system between senior junior leads to delays in decision-making or even increase or recurrence of diagnostic examinations. It is a dilemma, especially in the teaching hospital for consultation is a process that must be done as part of educational activities. In addition, the consultation recording is not equipped with time for consult and answer, so the length of time required by the consultation could not be counted. The consultation influence on LOS can be avoided if the tiered consultations system can be eliminated, the resident on duty in ED is a senior resident who already has the competence to take

decisions related to patient management, and DPJP or consultant on site play an active role in carrying out his responsibilities.

In a study at a tertiary teaching hospital in South Korea, to reduce waiting times for consultations that impact on the delay in the decision, the management carried out the program "SMS 2-4-8 project". This method proved to be effective in reducing the waiting time and ED LOS (Kim, Park et al. 2012: 296-302). Similar research has been conducted also by Cho et al. with a time of 3 and 6 hours (Cho, Jeong et al. 2011: 398-402),

In contrast to Chaou et al., Herring et al., And Brouns et al. researches where age causes elongation of the LOS, the results of research in the RSHS ED showed that with increasing age LOS will be shortened. This may occur because of differences in the characteristics of the research subjects. In his research, Chaou mention a few things that cause the LOS in elderly patients is longer than younger patients, such as complaints that are not clear and the difficulties of communication. This problem may be avoided in the RSHS ED because usually elderly patients is always accompanied by family or relations so it is easier to get medical history and faster decision-making. Another factor affecting the LOS is the condition of patient cognition and complexity of the disease. But these two factors cannot be analysed because lack of data.

Eventhough an interaction between age and triage category was found, but this can be considered not significant because the adjusted-R2 values obtained in the analysis of the interaction (40,3%) is not much different from the value of adjusted-R2 on a previous analysis (40%).

Based on the statistical analysis of the hypotheses that have been made in this research, it showed that age, the number of diagnostic examinations, the amount of consultation and triage category has a significant influence on the LOS ( $p < 0.05$ ). The growing number of diagnostic examinations and a growing number of consultations are influential in extending LOS. While triage category 2 and 3 will extend ED LOS, triage category 1 (resuscitation) and 4 (Slightly distress) are actually have shorter LOS. Age gives the opposite effect, increasing age actually shorten the LOS.

Limitations of this study include the availability of secondary data. In addition, most of the data was record manually so the clarity of the data is very depend on the individual who did the recording.

## 5. Conclusions and Suggestions

Number of diagnostic examinations, triage category, the number of consultations, and age are all factors that affect the LOS at Hasan Sadikin Hospital emergency department and number of diagnostic examinations has the greatest influence on ED LOS. Emergency department Length of Stay of Hasan Sadikin Hospital has not reached the standards set by the Ministry of Health, that is 8 hours. The median of ED LOS is 511 minutes (8 hours 31 minutes) and

during the study period only 47,14% of patients who have reached the standard LOS. The growing number of diagnostic examinations, triage category 2 or 3, the increase in the number of consultations effect in prolonging the LOS. While increasing age will shorten the LOS. It was found that the LOS in male patients is shorter than female patients.

Due to the number of diagnostic examinations is the most powerful influential variable, it is necessary to set an emergency room standard diagnostic examination. Department concerned can determine the types of examination that are emergencies that must be done in the ED and is required for decision making. Hospital management should enhance human resource capabilities that are directly related to the process of diagnostic examinations, such as nurses, radiology operators, and lab analysts, to prevent the failure of a diagnostic examination that impact on the repetition of the examination.

Internal or external consultations between departments need to be arranged more simpler with a clear time limit. Consultations between junior - senior can be avoided if the resident on duty in the ED is the senior resident, which already has the competence to perform direct patient management under the supervision of DPJP or consultant on-site. Hospital management can also develop a reporting system via SMS to DPJP using a computer-based application that connects directly to ED computer systems. This reporting system is expected to improve DPJP role in patient management and monitoring of the performance of resident. In addition, the hospital management need to develop clearer guidelines for DPJP task execution and on-site consultant including reordering methods of evaluation of the effectiveness of DPJP and on-site consultant performance.

The results of this new study could explain 40% of the factors that affect the LOS at Hasan Sadikin Hospital emergency department. Further research is needed to find a more in-depth and other factors that also affect LOS at Hasan Sadikin Hospital emergency department.

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