Factor analysis related to the length of stay of covid-19 patients in emergency installations.

Luckyta Wahyu Wulandari[1], Sri Andarini[2], Suryanto[3]

[1] Student of Master Program Faculty of Health Sciences
[2] Director of Universitas Brawijaya Hospital
[3] Lecture at Universitas Brawijaya, Faculty of Health Sciences

ARTICLE INFO

A B S T R A C T

The Emergency Department is the main door to medical services for patients suffering from illnesses and injuries, which can be life-threatening and require immediate treatment. In such circumstances, the actions taken must be effective and efficient. The length of stay is an effective indicator for evaluating the emergency department's performance and quality of care. Length of Stay is associated with the time of arrival, the time of laboratory examination, the time of radiological examination, and the number of doctor consultations. This research is a non-experimental quantitative survey using a retrospective research design. Data collection was carried out by observing the medical record file of each COVID-19 patient who visited the emergency room of dr. Soebandi Jember Hospital from when the patient arrived at the emergency room until he left the emergency room. The population of this study was 270 respondents, who were all COVID-19 patients, using simple random sampling techniques. The study's findings revealed a significant relationship between the patient's arrival time (0.000), laboratory examination time (0.000), radiological examination time (0.000), and length of stay in COVID-19 patients at dr. Soebandi Jember Hospital's Emergency Installation. According to the findings of this study, there was no significant relationship between the number of doctor consultations and the length of stay in COVID-19 patients (0.813). Laboratory examination time is the most dominant factor in the length of stay of COVID-19 patients in the emergency room, with a regression coefficient value of 0.173 (p-value < 0.005).

A B S T R A K

The Emergency Department is the main door to medical services for patients suffering from illnesses and injuries, which can be life-threatening and require immediate treatment. In such circumstances, the actions taken must be effective and efficient. The length of stay is an effective indicator for evaluating the emergency department's performance and quality of care. Length of Stay is associated with the time of arrival, the time of laboratory examination, the time of radiological examination, and the number of doctor consultations. This research is a non-experimental quantitative survey using a retrospective research design. Data collection was carried out by observing the medical record file of each COVID-19 patient who visited the emergency room of dr. Soebandi Jember Hospital from when the patient arrived at the emergency room until he left the emergency room. The population of this study was 270 respondents, who were all COVID-19 patients, using simple random sampling techniques. The study's findings revealed a significant relationship between the patient's

arrival time (0.000), laboratory examination time (0.000), radiological examination time (0.000), and length of stay in COVID-19 patients at dr. Soebandi Jember Hospital's Emergency Installation. According to the findings of this study, there was no significant relationship between the number of doctor consultations and the length of stay in COVID-19 patients (0.813). Laboratory examination time is the most dominant factor in the length of stay of COVID-19 patients in the emergency room, with a regression coefficient value of 0.173 (p-value < 0.005).

INTRODUCTION

The Emergency Department (ED) is a part of the hospital and is the main door of medical services for patients suffering from illness or injury, which can threaten their survival and require immediate treatment. An emergency is a clinical condition in which the patient needs immediate medical action to save lives and prevent further disability. In such circumstances, all actions taken must be effective and efficient (Pitang et al., 2016).

The *Length of Stay (LOS)* refers to how long a patient is treated in a single treatment period. In 2002, the UK Department of Health stipulated that the target for LOS in the emergency room or emergency department should not exceed 4 hours. Long waiting times and a long *Length of Stay (LOS)* in the emergency room will indicate the low quality of service in a hospital, which will result in the level of satisfaction of patients, families, companions, and visitors (Simanungkalit et al., 2021).

Every year, more than 2 million people come to visit the emergency room, and it is not uncommon for a buildup of patients or overcrowding, which is a serious problem that occurs in the emergency room and causes a long waiting time in the emergency room. The National Health Service in England established a target of no more than four hours in the emergency room. In the United States, 24.5% of patients have an emergency room waiting time of 4 hours, and 47.7% have a waiting time of 6 hours. In 2011, worldwide, there was a 65% increase in demand for hospital emergency room visits, resulting in increased waiting times, length of hospitalization, overcrowding, and delays in admission to inpatient rooms (Ahmed et al., 2020).

As covid-19 cases increase, visits to the emergency room will also increase, which will affect the length of hospitalization of covid-19 patients in the emergency room. Prolonged LOS in the Emergency Room (ER) has detrimental effects on patients, including the worsening of patients, increased costs, medical errors, and an increased incidence of death. Studies in Australia have shown that the length of LOS > 8 hours in the emergency department can cause up to 1,500 patient deaths per year. The high mortality rate is a problem in the emergency room, this occurs because of an increase in the number of patients in the emergency room who have not been immediately handled due to the lack of beds in other inpatient rooms so it will have an impact on the high mortality rate of patients (Pitang et al., 2016). The purpose of this study is to identify the factors associated with the length of stay in covid-19 patients at dr. Soebandi Jember Hospital's Emergency Installation.

METHOD

This research is a non-experimental quantitative survey and uses a retrospective research design. The data in this study was taken from the medical record file of each Covid-19 patient from the time the patient arrived at the emergency room until leaving the emergency room. Using a simple random sampling technique, the population of this study was 270 respondents, who were all covid-19 patients who had visited the dr. Soebandi Jember Hospital's Emergency Installation. The Health Research Ethics Committee of the Faculty of Health Sciences at Universitas Brawijaya Malang has stated that this research is ethically feasible with letter number 22F171121081. The collected data were then analyzed univariate, bivariate, and multivariate.

RESULTS AND DISCUSSION

The medical record data taken for this study is the medical record data of covid-19 patients who came to the emergency room of dr. Soebandi Jember Hospital from July 20 to August 20, 2022. In that period, 280 patients were obtained. Of the 280 patients, 10 of the researchers were excluded from the study due to data that did not match the inclusion criteria, leaving 270 patients who were respondents to the study.

The characteristics of the data from respondents based on age showed that most of the covid-19 patients who visited the emergency room of dr. Soebandi Jember Hospital was elderly (46–65 years), which was 41.5%. The characteristics of the data from respondents by gender showed that the majority (52.8%) of covid-19 patients who visited the emergency room of dr. Soebandi Jember Hospital was female. The characteristics of the data from respondents based on education level show that most (51.5%) of covid-19 patients who visit the emergency room of dr. Soebandi Jember Hospital is a high school or senior high school graduate. The characteristics of the data from respondents based on their work show that the majority (35.6%) of covid-19 patients who visit the IGD of dr. Soebandi Jember Hospital is working as housewives. The characteristics of the data from respondents based on religion show that the majority (97%) of covid-19 patients who visit the IGD of dr. Soebandi Jember Hospital is Muslim.

Table 1
Frequency Distribution of Research Variables

Variabel	N	Mean	Median	Min.	Max.	St. Deviasi
Length Of Stay	270	209,717	194,700	60,6	675,6	90,7610
Arrival Time	270	13,9740	14,4200	1,04	23,55	5,80359
Laboratory Examination Time	270	81,884	66,600	0,00	1944,0	134,7246
Radiological Examination Time	270	81,262	71,700	0,0	1434,0	130,2792
Number of Doctor Consultations	270	2,44	3,00	1	3	0,868

Sumber : Data Primer 2022

From the table above, it can be seen that the average for the entire variable is 209.7 minutes (3.5 hours) with a minimum value of 0.00 minutes. For the variable time of laboratory examination and radiological examination, the maximum value is 1944.0 minutes (32.4 hours) with a standard deviation of 0.868.

Table 2
The Relationship between Patient Arrival Time and LOS in Covid-19 Patients at the Emergency Installation of dr. Soebandi Jember Hospital

Variabel	Correlation Coefficient	Sig. (2-tailed)
Arrival Time * Length Of Stay	-0,295	0,000

Source : Primary Data 2022

The significance value (2-tailed) in the relationship of the patient's arrival time with LOS is 0.000 ($p < 0.05$) which means that H1 is accepted so that there is a significant relationship between the patient's arrival time and the Length of Stay in covid-19 patients. The correlation coefficient is -0.295, which means weak and negative, and means that if the two variables have a non-unidirectional relationship, the non-unidirectional relationship in question is a patient who comes to the emergency room between 1:00 a.m. and 12:00 p.m., then the length of stay at dr. Soebandi Jember Hospital's emergency installation will increase.

This study is in line with a study conducted by Hosseininejad et al, (2019), which states that patients who arrive at certain hours also have a relationship with the LOS of patients in the emergency room, especially in the hours of increased patient visits. This is consistent with the findings of Deviantony et al, (2017), who stated that the patient's arrival time during the afternoon shift has the potential to increase the length of stay in patients because the number of patient visits that come during the day is higher, so the number of patients who enter the emergency room also increases (Delinda & Nurhidayah, 2021).

Table 3
The Relationship between Laboratory Examination Time and LOS in Covid-19 Patients at the Emergency Installation of dr. Soebandi Jember Hospital

Variabel	Correlation Coefficient	Sig. (2-tailed)
Laboratory Examination Time * Length Of Stay	0,338	0,000

Source : Primary Data 2022

The significance value (2-tailed) in the relationship between laboratory examination time and LOS is 0.000 ($p < 0.05$) which means that H1 is accepted so that there is a significant relationship between the time of laboratory examination and the Length of Stay in covid-19 patients. The correlation coefficient is 0.338, which means weak and positive, and indicates that if the two variables have a unidirectional relationship, the longer the laboratory examination time, the longer the length of stay at dr. Soebandi Jember Hospital's emergency unit.

The duration of the laboratory examination depends on the number of requests for laboratory testing determined by the doctor. DL (complete blood), GDA (random blood sugar / time), FH (faal hemostasis, namely PTT and APTT), liver function (SGOT and SGPT), rapid COV-19, BUN, creatinine, electrolyte serum, and other tests are performed. This is in line with research conducted by Alemu et al, (2019) and Purwacaraka et al, (2019), which explained that laboratory examinations have a strong effect on the Length of Stay in the emergency room. According to the Ministry of Tourism in 2018, the time for laboratory examinations is 140–180 minutes. It is known that the average laboratory examination time is 141 minutes (1 hour and 2 minutes) according to the ideal susceptible, with a time difference of 19 minutes between the deviation and the average. So that the average can present the entire data.

Table 4
The Relationship between Radiological Examination Time and LOS in Covid-19 Patients at the Emergency Installation of dr. Soebandi Jember Hospital

Variabel	Correlation Coefficient	Sig. (2-tailed)
Radiological Examination Time * Length Of Stay	0,268	0,000

Source: Primary Data 2022

The significance value (2-tailed) in the relationship between radiological examination time and LOS is 0.000 ($p < 0.05$) which means H1 is accepted so that there is a significant relationship between the radiological examination time and the Length of Stay in covid-19 patients. The correlation coefficient is -0.268, which means weak and positive, and indicates that if the two variables have a unidirectional relationship, the longer the radiological examination time, the longer the length of stay at dr. Soebandi Jember Hospital's emergency unit.

According to Chalela's (2007) research, the length of time for radiological examinations performed during emergencies will affect the service time in the emergency room, and the length of time for radiological examinations performed during emergencies will affect the service time in the emergency room, which can affect the Length of Stay (LOS) of emergency room patients. The quality of the length of the radiology examination can be a trigger for the duration of the examination, including reliability, namely providing the best service and following minimum service standards (SPM) >2 hours, and the length of time for radiological examinations carried out during emergencies will affect the service time at

the Emergency Installation so that it can affect the patient's Length of Stay (LOS), starting from registration, examination, and results. Direct evidence includes physical facilities, equipment, officers, and means of communication. According to the ISO 9001:2008 international standardization program, the time from the patient to the photo to receiving the results that the radiologist has experienced is approximately 1 hour and 15 minutes (Yusri, 2015).

According to the Decree of the Minister of Health Number 129 / Menkes / SK / II / 2008 concerning Minimum Service Standards in Hospitals, SPM radiology services, one of which is the waiting time for the results of thorax photo services, with a minimum standard set at 3 hours.

Table 5
The Relationship Between the Number of Doctor Consultations and LOS in COVID-19 Patients at dr. Soebandi Jember Hospital's Emergency Installation

Variabel	Correlation Coefficient	Sig. (2-tailed)
Number of Doctor Consultations* *Length Of Stay*	-0,014	0,813

Source : Primary Data 2022

The significance value (2-tailed) in the relationship between the number of doctor consultations and LOS is 0.813 (p > 0.05) which means that H1 is rejected so that there is no significant relationship between the number of doctor consultations and the Length of Stay in covid-19 patients at the Emergency Installation of dr. Soebandi Jember Hospital.

According to research conducted by Delinda & Nurhidayah, (2021), the length of response time from specialist doctors will affect the length of decision making in previous actions. In addition to specialist doctors, patient support examinations can also affect the lengthening of the Length of Stay. According to Pakpahan et al, (2019) the faster the consultation process for specialist doctors, the shorter the LOS, and vice versa. The number of doctor consultations is influenced by several things, namely the severity of the patient's condition being examined, the speed of the specialist doctor's response to the consultation, and the duration of the consultation. If the patient arrives at the emergency room, this lengthens the consultation process Ahmed et al, (2020).The large number of DPJP doctor consultations does not always cause the duration of LOS, but it is not uncommon for it to cause LOS elongation.

Table 6
Factors that Have the Most Dominant Influence on Length of Stay (LOS) in covid-19 patients in the Emergency Installation of dr. Soebandi Jember Hospital

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Adjusted R Square	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF	
(Constant)		243,542	13,750		17,713	0,000			0,182
Arrival Time		-4,206	0,868	-0,269	-4,846	0,000	0,998	1,002	
Laboratory Time	Examination	0,173	0,038	0,257	4,606	0,000	0,989	1,011	
Radiological Time	Examination	0,133	0,039	0,190	3,415	0,001	0,989	1,011	

Source : Primary Data 2022

The variable that has the most influence or is most dominant on the Length of Stay of patients in the emergency room is the laboratory examination time variable, with a regression coefficient (B) value of 0.173 and a p value of 0.000 < 0.005. This equates to a 0.173 percent increase in length of stay.

According to Romiko, (2018), the results of the analysis of the relationship between the length of the laboratory examination and the patient's LOS revealed that there was a strong correlation with a positive direction between the length of the laboratory examination and LOS. This is in line with research conducted by Bukhari et al, (2014) who said that the reason for the lengthening of LOS in the emergency room is laboratory examination.

CONCLUSIONS AND SUGGESTIONS

(1) Arrival time has a significant relationship with *Length of Stay* (LOS) in COVID-19 patients at dr. Soebandi Jember Hospital's Emergency Installation. (2) The laboratory examination time has a significant relationship with the *Length of Stay* (LOS) in COVID-19 patients at dr. Soebandi Jember Hospital's Emergency Installation. (3) The radiology examination time has a significant relationship with the *Length of Stay* (LOS) in COVID-19 patients at dr. Soebandi Jember Hospital's Emergency Installation. (4) The number of doctor consultations has no significant relationship with the *Length of Stay* (LOS) in COVID-19 patients at dr. Soebandi Jember Hospital's Emergency Installation. (5) Laboratory examination time is the most important factor or has the strongest relationship with the *Length of Stay* (LOS) in COVID-19 patients at dr. Soebandi Jember Hospital's Emergency Installation. (6) Suggestions and inputs that are expected by the nurse to know the factors related to the patient's Length of Stay in the emergency room so as to minimize prolonged LOS in the emergency room.

DECLARATION OF CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

REFERENCES

Ahmed, A. A., Ibro, S. A., Melkamu, G., Seid, S. S., & Tesfaye, T. (2020). Length of Stay in the Emergency Department and its Associated Factors at Jimma Medical center, Southwest Ethiopia. *Open Access Emergency Medicine*, *12*, 227–235. https://doi.org/10.2147/OAEM.S254239

Alemu, G. H., Negari, K. G., Rodamo, K. M., & Hirigo, A. T. (2019). Factors Associated With The Length Of Stay In Emergency Departments In Southern-Ethiopia. *BMC Research Notes*, *12*(239), 1–5. https://doi.org/10.1186/s13104-019-4271-7

Bukhari, H., Albazli, K., Almaslmani, S., Attiah, A., Bukhary, E., Najjar, F., Qari, A., Sulaimani, N., Lihyani, A. A.-, Alhazmi, A., Maghrabi, H. A.-, Alyasi, O., Albarqi, S., & Eldin, A. S. (2014). Analysis of Waiting Time in Emergency Department of Al-Noor Specialist Hospital, Makkah, Saudi Arabia. *Open Journal of Emergency Medicine*, *2*(04), 67–73. https://doi.org/10.4236/ojem.2014.24012

Delinda, N., & Nurhidayah, I. (2021). Length Of Stay Pasien Di Instalasi Gawat Darurat (Length Of Stay Patients In The Emergency Room). *JIM FKep*, *5*(1), 179–191.

Deviantony, F., Ahsan, A., & Setyoadi, S. (2017). Analisis Faktor Yang Berhubungan Dengan Waktu Tunggu Pasien Setelah Keputusan Rawat Inap Di Putuskan di Zona Kuning Instalasi Gawat Darurat RSUD dr. Iskak Tulungagung. *NurseLine Journal*, *2*(2), 109–116.

Hosseininejad, S. M., Aminiahidashti, H., Pashaei, S. M., Khatir, I. G., Montazer, S. H., Bozorgi, F., & Mahmoudi, F. (2019). Determinants of prolonged length of stay in the emergency department; a cross-sectional study. *Archives of Academic Emergency Medicine*, *7*(1), 1–6.

Pakpahan, J., Zuhriyah, L., & Kartikawatiningsih, D. (2019). *Studi Penerapan Metode Kasus Dan Pengaruh Terhadap Los (Length Of Stay) Di IGD RSUD Ngudi Waluyo Wlingi Kabupaten Blitar. 421.*

Pitang, Y., Widjajanto, E., & Ningsih, D. K. (2016). Pengaruh Peran Perawat Sebagai Care Giver Terhadap Length of Stay di IGD RSUD DR.T.C.Hillerrs Maumere. *Jurnal Ilmu Keperawatan*, *4*(2), 240–255.

Purwacaraka, M., Ahsan, A., & Nasution, T. H. (2019). Correlation of Admision Time, Discharge Time and Patients Discharge Type With Length of Stay in Yellow Zone of Emergency Department. *The Malaysian Journal of Nursing*, *11*(01), 10–15. https://doi.org/10.31674/mjn.2019.v11i01.002

Romiko, R. (2018). Faktor-Faktor Yang Berhubungan Dengan Lama Waktu Tunggu Pasien Di Igd Rs Muhammadiyah Palembang. *Jurnal 'Aisyiyah Medika*, *2*(1). https://doi.org/10.36729/jam.v2i1.199

Simanungkalit, S. K., Holipah, H., Dewanto, A., & David, D. (2021). Faktor yang Berperan dalam Pemanjangan Length of Stay Pasien IGD di Masa Pandemi Covid-19 : Studi pada Persada Hospital Factors Contributing to Length of Stay Prolongation among Emergency Room Patients during the Covid-19 Pandemic : A Study at Persada Hos. *Jurnal Kedokteran Brawi j Aya*, *31*(2), 17–21. https://doi.org/http://dx.doi.org/10.21776/ub.jkb.2021.031.05.X

Yusri, M. (2015). Analisis Faktor yang Berhubungan dengan Waktu Tunggu Pemeriksaan Foto Toraks Pasien Rawat Jalan di Instalasi Radiologi Rumah Sakit Dr. Mohammad Hoesin Palembang Tahun 2015. *Jurnal Administrasi Rumah Sakit Indonesia*, *2*(1), 64–71. https://doi.org/10.7454/arsi.v2i1.2189