

Factors Associated with Prolonged Length of Stay in the Ambulatory Care Unit of a Tertiary Government Hospital

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ABSTRACT

Background. Length of stay is one of the metrics of crowding in the emergency department. Identification of the factors associated with prolonged length of stay is vital for staffing and policy making to prevent overcrowding at the ambulatory care unit.

Objective. This study aimed to determine the association of sociodemographic, clinical, and temporal factors with length of stay among patients seen at the ambulatory care unit of a tertiary government training hospital.

Methods. A retrospective case-control study was conducted between January to December 2019 at the ambulatory care unit of a tertiary government hospital. Charts of patients who stayed for more than six (6) hours were classified as cases, while those who stayed for more than two (2) hours up to six (6) hours were classified as controls. Charts were reviewed to obtain the clinicodemographic profile of patients who satisfied the inclusion criteria.

Results. The case group consisted of 86 patients, while the control group consisted of 172 patients. Eight factors had an effect on the probability of prolonged length of stay at the ambulatory care unit: age 40-59 years old (OR = 2.29, 95% CI: 1.16-4.49), ESI 3 at triage level (OR = 3.35, 95% CI: 1.50-8.38), psychiatric complaint (OR = 6.97, 95% CI: 2.53-19.21), medications given and diagnostics done (OR = 2.16, 95% CI: 1.16-3.99), medications given/diagnostics/referral to other services done (OR = 7.67, 95% CI: 2.70-21.80), psychiatric/substance-related case (OR = 6.97, 95% CI: 2.63-18.49), transferred to other services (OR = 3.25, 95% CI: 1.33-7.94), and endorsed to next shift (OR = 6.94, 95% CI = 3.90-12.35).

Conclusion. The factors associated with prolonged length of stay were middle-aged adults, conditions with severe presentation, psychiatric/substance-use-related cases, need for more diagnostic test and treatment intervention, and decision to transfer care to other services.

Keywords: prolonged length of stay, ambulatory care, urgent care



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INTRODUCTION

Crowding in the emergency department (ED) is a public health concern that affects access to healthcare globally. It occurs when the demand for services exceeds the capacity of the staff and the physical environment to provide quality care within appropriate time frames.¹ There is no standard of measurement despite having numerous studies on factors and outcomes associated with crowding.² One of the recommended metrics of crowding in the ED is length of stay.

Length of stay (LOS) at the ED can be defined as the time interval from a patient's arrival to discharge.³ Investigation of the factors that contribute to process times and patient care delays is important as LOS correlates with ED efficiency. A systematic review done by Kreindler

et al. demonstrated that the factors most commonly associated with prolonged LOS were the patient's need for admission, older age, receipt of diagnostic tests or acute care interventions, and status of health insurance.⁴ One study done in the Philippines identified similar factors affecting LOS of patients in the ED of a private hospital regardless of status or reason for consultation.⁵ In terms of severity of condition, Yoon et al. found that urgent and less urgent cases have the longest stay due to increased waiting times to nurse and physician assessment.⁶ Despite numerous ED and patient characteristics associated with prolonged ED LOS, however, available information was insufficient to decide which factors need to be targeted to optimize ED logistics.

In the ED of the current study, patients assessed by the triage to have less urgent concerns are seen in the ambulatory care unit (ACU). This means that patients seen at this unit require at most one resource to be stabilized. Based on the policies of the ACU, care must be provided to all adult and pediatric cases, and disposition whether the patient should be sent home or admitted for further management must be decided within six hours.⁷ A study done in Australia reported shorter LOS in private treatment centers compared to public hospitals due to higher incentives for better use of resources and ensuring timely discharge.⁸ At present, studies on LOS have focused on identifying factors prolonging stay for all patients in the ED. No studies have yet been done to determine those that affect LOS of less urgent cases in the ACU.

This study aimed to determine the association of sociodemographic, clinical, and temporal factors with prolonged LOS among patients seen at the ACU of a tertiary government hospital from January 1, 2019 to December 31, 2019. Specifically, the study aimed to compare the clinicodemographic profile of patients and the temporal pattern of consults done at the ACU with prolonged vs non-prolonged length of stay.

METHODS

Study Design

This was a case-control study involving a retrospective chart review of patients who sought consultation at the ACU from January 1 to December 31 2019. The protocol was approved by an ethics review board prior to research implementation (UPMREB 2022-0161-01).

Study Population

The charts of patients who stayed for more than six hours in the ACU comprised the case group, while charts of patients who stayed for more than two hours up to six hours comprised the control group. Consultations of adult and pediatric patients initially assessed to have less urgent concerns were included. Charts which documented ambulatory care management facilitated in less than two hours, patients who left without being seen or left without treatment, and

patients who came in only for refill of prescription, laboratory interpretation, or procedures were excluded. A cut-off point of six hours was used as an acceptable length of stay in the ACU as stipulated in the Manual of Operations.⁷ A cut-off point of two hours, on the other hand, was used for the minimum length of stay following the new guidelines set in the ACU.

Sample Size

G*Power version 3.1.9.4 was used in the estimation of sample size with an alpha error probability of 0.05, power of 0.80, and a squared population correlation of 0.05. Eighty-six patient charts for each sample arm was included, with two controls recruited for every one case, making a total sample size of 258.

Data Collection and Analysis

Data were collected from the ACU census and medical charts. Classification of patients into case or control group was based on the length of stay recorded in the census. The charts of eligible patients were retrieved and examined for all bases of exclusion. A data collection tool developed based on the study objectives was used to obtain the details from the medical charts. The variables measured included LOS, sociodemographic characteristics, clinical data, and temporal patterns. Data was encoded using Microsoft Excel and analyzed using Epi Info 7. Continuous data were presented as mean (standard deviation, SD), while categorical data were presented as frequencies or percentages. Associations of sociodemographic, clinical, and temporal characteristics were done using simple logistic regression and presented as odds ratios (OR) with 95%-confidence intervals (CI). All statistical tests were two-tailed and $p=0.05$ determined statistical significance.

RESULTS

A total of 258 charts were included in the study. The case group consisted of 86 patients who stayed more than six hours in the ACU, and the control group consisted of 172 patients who stayed for more than two hours up to six hours. The case group stayed at an average of 8.6 hours (SD \pm 3.6 hours), while the control group was given care at a mean time of 3.4 hours (SD \pm 1.0 hour).

Sociodemographic Profile

More than a third of the charts (35%) were consultations from pediatric patients. Majority of the medical records reviewed were from patients with female gender (52%), single status (65%), Roman Catholic religion (87%), and lived near the vicinity of the hospital (70%).

Adults aged between 40 and 59 years (OR 2.29, CI 1.16-4.49) have more than twice the odds of staying longer at the ED (Table 1). Ages above and below this age group were not significantly associated with extended LOS.

Clinical Characteristics

Patients presenting with psychiatric complaints (OR 6.97, CI 2.53-19.21) have a higher risk of staying longer at the ACU. Conversely, neurologic consults (OR 0.10, CI 0.01-0.92) stay for a shorter period of time. The presence of multiple comorbidities among patients (OR 1.44, CI 0.62-3.35) does not significantly contribute to a long duration of care. Consultations of patients with more severe presentation (ESI 3) or those estimated to need more than one resource for care on arrival (OR 3.55, CI 1.50-8.38) also have greater odds of being managed at a time beyond what is recommended by the ED. Consultations that required medical management and diagnostic testing while at the ACU had a higher risk of prolonged time before they were given disposition (OR 2.16, CI 1.16-3.99), with higher odds when they have to be seen by another service (OR 7.67, CI 2.70-21.80) (Table 1).

Temporal Patterns

Patients who experienced staff shift change have greater odds of staying longer at the ACU (OR 6.94, CI 3.90-12.35) (Table 1). Consultations done during the evening shift (OR 1.63, CI 0.96-2.77), weekday (OR 1.20, CI 0.67-2.18), or months when new residents or interns start their duties, i.e., January (OR 0.67, CI 0.25-1.83) or July (1.08, CI 0.37-3.15), were not associated with longer treatment time.

DISCUSSION

Sociodemographic profile, clinical characteristics, and temporal patterns of patients seeking care at the ACU were found to be important determinants of length of stay. Significant factors identified in this study were age, higher initial triage level, consultations related to mental health, receipt of multiple interventions, interdepartmental transfer of care, and shift change.

Among all sociodemographic factors evaluated, consultations of middle-age adults have higher odds of staying longer at the ACU. In general, consultations of older patients have a longer LOS as these cases are more clinically complex, require more time and attention, present more often with

comorbidities, and are more often hospitalized.⁹⁻¹¹ This study found no statistical difference for elderly individuals partly due to the low proportion of this age group in the population. Other sociodemographic factors like gender, marital status, and accessibility to hospital revealed no statistical significance. This result is consistent with studies done in a low-income country except for accessibility. ED stay was observed to be longer for patients coming from places distant to the hospital with poor access to transport and primary care services or other health facilities which often leads to a much worse presentation upon consultation.¹²

Severe presentation and the need for more than one resource to arrive at a disposition were found to be a risk for longer treatment time. This association was due to patients' need for admission as well as hospital bed shortage.⁴ In addition, these patients often come in with vague clinical presentation that does not clearly justify admission or discharge, hence they require prolonged observation and treatment in the ED.⁶ Patients who received more than one type of service tend to stay beyond the recommended duration of care. This is attributed to additional waiting times required for every diagnostic test requested including the preparation of the patient for the test, transport in and out of the ED, actual conduct of the test, and releasing of final results by the pathologist or radiologist on duty.^{6,13,14} In general, patients who need admission stay longer than non-admitted ones as they need further evaluation and consultations with other services.⁶

This study analyzed consultations based on the nature of their chief complaint and the type of case. Gynecologic, psychiatric, surgical or trauma cases, and neurological or neurosurgical cases are generally referred to their specialists while at the ACU. Results showed that cases that are psychiatric or substance-related in nature had greater risk of staying longer hours at the ED. Similar findings were found in several studies reporting that visits related to mental health and substance abuse have a longer LOS regardless of acuity due to their need for admission.^{15,16} In addition to this, psychiatrists are called only to the ED when there is a patient being referred leading to a longer waiting time for patients. Neurologic consults have a higher risk of

Table 1. Factors Associated with Prolonged Length of Stay at the Ambulatory Care Unit

Variable	Odds Ratio	95% CI	p value
Age, 40-59	2.29	1.16-4.49	0.0165
Initial triage level, ESI 3	3.55	1.50-8.38	0.0039
Chief complaint, Psychiatric	6.97	2.53-19.21	0.0002
Number of services provided			
Medication given and diagnostics done	2.16	1.16-3.99	0.0146
Medication given, diagnostics, and referral to other services done	7.67	2.70-21.80	0.0001
Type of case, Psychiatric/ Substance-related	6.97	2.63-18.49	0.0001
Disposition, Transferred to other services	3.25	1.33-7.94	0.0098
Endorsed to next shift, Yes	6.94	3.90-12.35	<0.0001

being discharged earlier from the ACU because they were immediately referred for transfer of care at the ED. There was no significant association between length of stay and gynecologic or surgical cases.

The need to transfer care to other services and staff shift changes were temporal patterns found to significantly contribute to a longer duration of care. The ACU of the ED ideally only receives and manages patients that are ambulatory and can be sent home after a test or intervention is performed. However, some patients triaged to this unit were assessed to be in a more severe condition or would require hospital admission hence the need to transfer care. In the area where the study was conducted, the availability of the resident physicians who can receive the endorsement for transfer remains a problem. Poor communication between physicians, insufficient number of consultation staff personnel, and a shortage of inpatient beds were reasons found to cause this delay.^{12,17} Change of staff between shifts was a significant predictor related to findings mentioned from previous studies. Additional reasons noted to contribute to the longer stay of patients during this period were reduction in the number of physicians available between changes in duty group or a decreased efficiency of the outgoing team during later hours of work.¹⁸

The days of the week and month of the year when the consultations occurred did not have a significant association with the LOS of patients. Assessment based on days did not show significant differences due to the presence of time-varying predictors that may change within a 24-hour period.¹⁹ However, other studies found that duration of stay was shorter during weekends due to fewer consultations and longer during weekdays due to inadequate resources and relatively high proportion of patients.^{12,15,20} The LOS during months when new residents or interns were undergoing orientation to their roles has also been thought to contribute to ED crowding, however, the study done by Riguzzi et al. revealed that there was little variability throughout the year.²¹

Strengthening of discharge policy from the triage and pre-screening of less urgent cases to receive basic orders before being seen at the ambulatory unit is recommended.^{22,23} A review of turnaround times for diagnostic tests as well as increasing the availability of point of care services at the ACU can help hasten disposition times. Variations within a 24-hour period may also be included in future studies instead of a daily evaluation to elicit effects of time periods in the length of stay of patients. As the unit mostly caters to patients with less urgent conditions, investigation of the factors that prolong LOS may lead to the development of guidelines and algorithms. These in turn can lead to expansion of services and modification of workflow processes which can prevent ED overcrowding.

Limitations

The study revealed several factors that contribute to prolonged LOS of patients at the ACU of a government

tertiary hospital, and these factors can be addressed for quality improvement. However, the findings of the study must be interpreted in the context of its limitations. The data was extracted through review of charts thus deficiencies in the documentation of what transpired during consultation was solely based on the review. The applicability of this study may also be limited to facilities with similar policies and processes.

CONCLUSIONS

There are sociodemographic, clinical, and temporal factors that contribute to longer stay of patients at the ACU. Higher odds of prolonged LOS were seen for middle-aged adults, conditions with severe presentation, psychiatric or substance-related cases, receipt of more than one type of service, and need for transfer to other services. As the ACU was expected to cater only to patients with less urgent concerns, those who present with more clinically complex cases that need further evaluation and possible admission were evidently found to stay longer. For this reason, investigation of these factors which lead to improvement of workflow processes will assist in controlling crowding at the ED.

Statement of Authorship

All authors certified fulfillment of ICMJE authorship criteria.

Author Disclosure

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