Association of Length of Stay at Emergency Services in the Outcome of Admitted Patients

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Abstract

Background: Access block and overcrowding leading to prolonged stay in emergency room is a common problem of Emergency services of Tribhuvan University Teaching Hospital (TUTH) Kathmandu. Those patients who stayed longer in emergency department might affect continuing care and the ultimate outcome of patients. Study aims to evaluate the association of emergency services length of stay and outcome of admitted patients in wards or Intensive Care Unit at the predefined cut-off value of 6 hour. Methods: It was a prospective cross sectional comparative study done in TUTH, Kathmandu. Data were collected from records from emergency services, wards, ICU and hospital record section from October, 2018 to April, 2019. Adult patients were grouped in to two groups; Emergency services to wards (ES to Wards) and Emergency services to ICU (ES to ICU). Outcome was compared between those admitted within 6hr and those admitted after 6hr of stay in emergency services. Results: A total of 2,059 patients were enrolled over 6 months. Out of them, Male were 55.5% and 42.6% patients were at the age of equal to or above 60 years. Total admitted patients who stayed equal to or less than 6 hr in emergency services was 26.7%. It was found that there was no significant association between Emergency services length of stay (ESLOS) and outcome of admitted total patients (p= 0.160) as well as in ICU (p= 0.559) or Ward admitted patients (p= 0.361). Age was found independent predictor for outcome (p= <0.01). Association of ESLOS and age was also found statistically significant (p= 0.02). Conclusions: Emergency service length of stay is not predictor for outcome of admitted patients.

Key words: Emergency services, intensive care unit, length of stay, mortality.

Background

Tribhuvan University Teaching Hospital (TUTH), is a tertiary hospital and receives the
patients from various corners of Nepal and gets around 40,000 patients per annum in emergency services. Each day around 150 patients visit to Emergency services for treatment and out of them around 16% patients admitted to wards, ICU and high dependency bed. Access block and overcrowding leading to prolonged stay in emergency room is a common problem of Emergency services of Tribhuvan University Teaching Hospital, Kathmandu. Patients generally stay in emergency room even up to one week.

Outcome of ill patients depends upon the time, process and management.\textsuperscript{1-3} The length of stay in emergency department and interventions before admission either in ward, intensive care or high dependency unit influence the patient outcome.\textsuperscript{4-6} Emergency Services is a source of patients admitted in wards and intensive care unit (ICU)\textsuperscript{7}. Access block and overcrowding are related with patient harm including increased length of stay, increased medical errors, morbidity and mortality\textsuperscript{8-17}. The critically ill patients benefit from close involvement by ICU physician and one to one nursing,\textsuperscript{18-21} elements of care not often present in emergency services. The positive impact of ICU admission on patient survival is more evident during the first 72 hours of critical illness,\textsuperscript{22} two observational studies, one in the USA\textsuperscript{23} and one in Australia\textsuperscript{24} found that time in ED was an independent risk factor for ICU mortality. A retrospective analysis of patients with sepsis presenting to the Emergency department between 1997 and 2005 at Australasian and New Zeland hospitals suggested similar findings.\textsuperscript{25} Some other studies reported a five times higher risk of death, and a two times longer stay among patients not immediately admitted to the ICU.\textsuperscript{26} It has been shown that patients meeting ICU admission criteria and treated in the ICU, had a survival benefit.\textsuperscript{22} however some studies show no clear association between delayed admission and poor
outcome.\textsuperscript{27} Studies are done outside regarding this but no such studies are done so far in Nepal. We cannot generalize outside the country conclusions in our perspective as we have very different scenario as well as we have limited resources. Local quality and resource factors and resource factors might influence generalisability and the comparison of studies that relate emergency services length of stay to patient outcome.

Health care systems are required to cope with increasing demand for services with limited resources.\textsuperscript{28} This is demonstrated by Access block in Emergency service, where patients in emergency services may experience difficulty in getting admitted in wards/ICU in a timely fashion.\textsuperscript{8,28,29}

In Nepal, definition of Emergency services access block is emergency services length of stay of greater than six hour and this issued as a key performance indicator. However, there is little data to support the use of any particular time frame as an indicator of quality of care.

Emergency services overcrowding, access block and increased emergency department length of stay show broader health system issues, such as reduced inpatient bed numbers, high bed occupancy and increased number of patient flow.

The rationale for doing this study to know whether Emergency services length of stay is a independent predictor for outcome or not as in our hospital, longer Emergency services length of stay is a major problem for proving the continuing care with limited manpower and resources.\textsuperscript{30}

The objective of this study to compare the association between emergency services length of stay and outcome of patients admitted from emergency services directly to a ward or ICU at the predefined cut-off value of 6 hours.
Methods

Setting

Tribhuvan University Teaching Hospital, Kathmandu, Nepal, tertiary referral hospital. The Emergency services has approximately 40,000 patient presentations per annum.

Institutional Review Board (IRB) permission approved to conduct this study.

Inclusion Criteria

Age more than 16 years
Patients who are admitted from the Emergency services of TUTH to Ward or ICU

Exclusion criteria

Patients who are admitted from the Emergency services directly to the operation theatre or discharged from emergency services or left against the medical advice from emergency or those patients who are admitted to psychiatry and deaddiction ward.
Those patients who are in observation unit of Emergency services.

Study design and period

It was a prospective comparative study. It evaluated association of Emergency services length of stay and outcome of admitted patients at the predefined cut-off value of 6 hour.

Study period was two and half years however data were collected since Oct, 2018 to April, 2019. Data were collected from records of emergency services and wards as well as hospital record section. Criteria fulfilled patients who were presented to our study period are enrolled in this study. Comparison was done in respect to admission of patients from Emergency services to ward and Emergency services to ICU, ICCU or SICU less than 6 hour of Emergency services length of stay (ESLOS) or more than 6hr of ESLOS separately.

Comparison was done with regard to hospital outcome (Expired during hospital stay, left against medical advice (LAMA), or discharged from hospital)

Patients are divided into following categories.

Ward (direct admission from Emergency services to a Ward)
ICU (direct admission from Emergency services to a ICU)

Data analysis and statistics.
Data were analyzed using SPSS Statistics 17 by Chi-square test.

Results

From Oct, 2013 to April, 2014, there were 2,059 criteria fulfilled patients admitted either to ward or ICU. Out of them, Male patients were 55.5% and 42.6% patients were at the age of equal to or above 60 years.

Total admitted patients who stayed equal to or less than 6 hr in emergency services before admission after presentation to emergency, was 26.7%. Analyzing the ICU admitted patients separately, 35% patients were admitted in ICU after staying less than or equal to 6 hr in emergency services. When compared to total patients, ICU admitted patients had shorter length of stay in emergency services though it is not found statistically significant.

Table 1: Association of Outcome and ESLOS in total admitted patients.

| emergency stay in hours | outcome | Total |
|-------------------------|---------|-------|
|                         | expired | LAMA  | discharged |       |
| <=6 hrs                 | 55      | 1     | 495        | 551   |
|                         | 10.0%   | 0.2%  | 89.8%      | 100.0%|
| > 6 hrs                 | 121     | 10    | 1,377      | 1,508 |
|                         | 8.0%    | 0.7%  | 91.3%      | 100.0%|

Table 2: Association of Outcome and ESLOS in ICU admitted patients.

| emergency stay | outcome | Total |
|---------------|---------|-------|
|               | expired | LAMA  | discharged |       |
| <=6 hrs       | 16      | 0     | 64         | 80    |
|               | 20.0%   | 0.0%  | 80.0%      | 100.0%|
| > 6 hrs       | 30      | 3     | 115        | 148   |
|               | 20.3%   | 2.0%  | 77.7%      | 100.0%|

Table 3: Association of Outcome and ESLOS in Ward admitted patients

\[ P = 0.361 \]
Admitted patients were grouped into age wise and Age is found independent predictor for outcome. Association of ESLOS and age is also found statistically significant.

Table 4: Association of Age and ESLOS of admitted patients.

| Age  | stay_hr | <=6 hrs | > 6 hrs | Total |
|------|---------|---------|---------|-------|
| <20  | <=6 hrs | 22      | 64      | 86    |
|      |         | 25.6%   | 74.4%   | 100.0%|
|      | > 6 hrs |         |         |       |
| 20-39| <=6 hrs | 119     | 324     | 443   |
|      |         | 26.9%   | 73.1%   | 100.0%|
|      | > 6 hrs |         |         |       |
| 40-59| <=6 hrs | 148     | 503     | 651   |
|      |         | 22.7%   | 77.3%   | 100.0%|
|      | > 6 hrs |         |         |       |
| =60  | <=6 hrs | 262     | 617     | 879   |
|      |         | 29.8%   | 70.2%   | 100.0%|
|      | > 6 hrs |         |         |       |

Table 5: Association Sex and Outcome of admitted patients

| Sex | expired | LAMA | discharged | Total |
|-----|---------|------|------------|-------|
| F   | 82      | 4    | 830        | 916   |
|     | 9.0%    | 0.4% | 90.6%      | 100.0%|
| M   | 94      | 7    | 1,042      | 1,143 |
|     | 8.2%    | 0.6% | 91.2%      | 100.0%|
|     | 176     | 11   | 1,872      | 2,059 |
|     | 8.5%    | 0.5% | 90.9%      | 100.0%|
Table 6: Association of Sex and ESLOS of admitted patients.

| Sex | stay_hr | <=6 hrs | > 6 hrs | Total |
|-----|---------|---------|---------|-------|
|     |         |         |         |       |
| F   |         | 229     | 687     | 916   |
|     |         | 25.0%   | 75.0%   | 100.0%|
| M   |         | 322     | 821     | 1,143 |
|     |         | 28.2%   | 71.8%   | 100.0%|
|     |         | 551     | 1,508   | 2,059 |
|     |         | 26.8%   | 73.2%   | 100.0%|

Discussion
This study explored the association of emergency services length of study and outcome of admitted patients either to Ward or ICU. Association between ESLOS and outcome was not found statistically significant in total admitted patients from emergency services during our study period.

Total admitted patients were divided into two groups; one those admitted from emergency services to ICU and other is emergency services to wards. Association between ESLOS and outcome was not found significant in both groups when analyzed separately.

Our study conclusion was consistent with Manthous et al.\textsuperscript{31} That study done in critically ill patients by in Connecticut in USA showed outcomes of critically ill patients transferred from emergency department to medical intensive care unit within 24 hour were not better than those who remained in emergency services for longer durations. Other study “the effect of emergency department delay on outcome in critically ill medical patients: evaluation using hospital mortality and quality of at 6 months” by Saukkonen et al\textsuperscript{32}
showed no clear association between delayed admission and poor outcome.

However, Flavouris et al showed that emergency department length of stay was greater in for ED to ward patients, and of the ED to ward patients who died. Don et al found that delayed admission to acute hospital beds is associated with worse outcomes. Two observational studies, one in the USA and one in Australia found that time in ED was an independent risk factor for ICU mortality. Young et al showed that a five times higher risk of death, and a two times longer stay among patients not immediately admitted to the ICU.

Simchen et al reported that the positive impact of ICU admission on patient survival is more evident during the first 72 hours of critical illness. It has been shown that patients meeting ICU admission criteria and treated in the ICU, compared to those treated out of the ICU, had a survival benefit.

A retrospective analysis of patients with sepsis presenting to the ED between 1997 and 2005 at Australian and New Zealand hospitals also showed time in ED was an independent risk factor for hospital mortality.

Age was found statistically significant for outcome when analyzed in those admitted patients. However, Sex was not found to be predictor for outcome.

While evaluating the age of admitted patients with ESLOS, it was found significant showing that younger age patients has less ESLOS compared to older age patients. However, association with sex and ESLOS was not found significant showing no gender bias.

Our study conclusion, no association of outcome and ESLOS might be due to patients were treated with the same line of management irrespective of place of patient treated. In emergency, patients were well prioritized by triaging the presented patients. To
generalize this conclusion, such type study with longer duration and in multiple centres should be done.

Conclusions

Access block is a common problem in TUTH emergency services however emergency service length of stay is not predictor for outcome of admitted patients either to ward or ICU. While, age was found significant for outcome.

Declarations

Ethics approval and consent to participate: Ethical approval was taken from Institutional review board (IRB) of Institute of Medicine, Kathmandu, Nepal. Verbal consent was taken from the participants of the study. Consent for less than 16 years patients were taken from their guardians. Written consent could not be possible for all patients because many were illiterate and acuity of the conditions they presented.

Consent for publication: I hereby, give consent for the publication as disseminated message ultimately help the patients care.

Availability of data and material: Data were taken from the hospital records as well as emergency record file.

Competing interests: None declared

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Authors' contributions: Co-authors contributed in data collection and statistics.

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Figures

![Graph 1: Age and outcome wise distribution of admitted patients](image)

\( p = 0.02 \)