

Original Article

DOI: 10.22114/ajem.v0i0.58

Causes of Prolonged Emergency Department Stay; a Cross-sectional Action Research

Roya Esmaeili¹, Seyed-Mojtaba Aghili¹, Mojtaba Sedaghat², Mohammad Afzalimoghaddam^{1*}

1. Department of Emergency Medicine, Imam Khomeini Hospital Complex, Tehran University of Medical Sciences, Tehran, Iran.

2. Community Medicine Department, Tehran University of Medical Sciences, Tehran, Iran.

*Corresponding author: Mohammad Afzalimoghaddam; Email: afzalimoghadam@tums.ac.ir

Abstract

Introduction: Based on the existing standards, patients presenting to emergency department (ED) should receive a decision in a maximum of 6 hours after admission to ED and leave ED in this time. Unfortunately, most of the time, especially in general and referral hospitals, we witness patients staying in the ED for hours or even days after a decision has been made.

Objective: the present study was performed with the aim of evaluating the causes of patients' prolonged length of stay in ED of one of the major hospitals in Tehran, Iran.

Method: The present cross-sectional action research was carried out in the ED of Imam Khomeini Hospital, Tehran, Iran, in November and December 2016. The studied population consisted of patients who stayed in ED for more than 12 hours. In a panel consist of specialists, semi-structured and open questions were asked from the participants. All the interviews were recorded and converted to text. Effective factors of staying more than 12 hours in ED mentioned by the interviewees were extracted. A checklist of evaluating the causes of more than 12 hours stay in ED was prepared. In the next stage, by daily visit to the ED of the studied hospital, profile of the patients who had stayed in the ED for more than 12 hours was evaluated and the variables determined in the checklist were assessed.

Results: In the present study, 407 patients with the mean age of 54.07 ± 20.18 years (minimum 1 and maximum 113 years) were studied, 270 (65.7%) of which were male. Respectively, 26 (6.4%) were admitted in triage level 1, 203 (49.9%) in triage level 2, 168 (41.3%) in triage level 3, 9 (2.2%) in triage level 4 and 1 (0.2%) in triage level 5. Based on these findings, "services not wanting to transfer patients with decisions to the service" was the most common factor.

Conclusion: In the present study, specialized services not tending to dislocate the patients that have been decided upon to their respective department, a considerable number of complicated patients and patients with advanced underlying illnesses among those presenting to ED, and shortage of beds in specialized departments and ICU, were the most common causes affecting more than 12 hours stay of patients in the studied ED.

Key words: Emergency service, hospital; Health services research; Hospital bed capacity; Length of stay

Cite this article as: Esmaeili R, Aghili SM, Sedaghat M, Afzalimoghaddam M. Causes of Prolonged Emergency Department Stay; a Cross-sectional Action Research. *Adv J Emerg Med.* 2018;2(2): e18.

INTRODUCTION

Overcrowding in emergency departments (EDs) has turned into a common and global crisis and meanwhile, lack of timely decision making and service providence leads to an increase in the risk of adverse outcomes, mortality, dissatisfaction of patient and their companions, increase in costs and even, violence and interference with the normal events occurring in ED (1-4).

Following the execution of Health Sector Evolution Plan (HSEP) in government hospitals of Iran on May 5, 2014, this overcrowding in EDs has become more significant than past years, which resulted in more dissatisfaction of the patients from treatment

services of the hospital (5, 6). Based on the existing standards, patients presenting to ED should receive a decision in a maximum of 6 hours after admission to ED and leave ED in this time (7-9).

Unfortunately, most of the time, especially in general and referral hospitals, we witness patients staying in the ED for hours or even days after a decision has been made (5). Considering the execution of HSEP and paying treatment expenses from the common budget and the given right of the patients for receiving proper treatment services, re-evaluation and revising the processes affecting the duration of ED stay as one of the major

components in HSEP and the treatment system of Iran seems necessary. It is obvious that evaluating the causes of prolonged length of stay among patients in ED and proposing practical solutions for facing it significantly helps increase the quality of care given and therefore leads to higher satisfaction of the patients. During recent years, extensive studies have evaluated the causes of prolonged stay of patient in ED searching for a solution to this problem. Ordering unnecessary tests, performing time-consuming interventions, delay in performance of consultations, delay in sending test results, delay in initiation of nursing cares due to overcrowding of the ED, shortage of nursing and medical staff considering the number of emergency patients, presence of critically ill patients and those in need of intensive care unit (ICU) care have been proposed as causes of prolonged stay (10).

However, for each center, these causes are different from other centers and effective solutions for one center may be useless for other centers and therefore, for eliminating effective factors this management evaluation is necessary (11). Therefore, the present study was performed with the aim of evaluating the causes of patients' prolonged length of stay in ED of one of the major hospitals in Tehran, Iran.

METHODS

Study design

The present cross-sectional action research was carried out in the ED of Imam Khomeini Hospital, Tehran, Iran, in November and December 2016. Protocol of the study was initially assessed in the research council of emergency medicine group and after making the necessary changes and revisions it was also approved by the ethics committee of Tehran University of Medical Sciences. The researchers also adhered to the principles of confidentiality throughout the study period.

Study population

The studied population consisted of patients who stayed in ED for more than 12 hours. Those who were discharged against medical advice, ran away or died were excluded from the study. Additionally, repeated patients who had stayed in ED for a few days were excluded from the statistics of the next days. By considering $\alpha=0.05$, $P=30\%$ and $D=4.5\%$, using $N=(Z_{1-\alpha/2})^2 \times P \times (100-P) / D^2$ formula, sample size was calculated to be 400 cases. Sampling was done using census method and data gathering was continued until data saturation was reached.

Data gathering

Initially, a panel of specialists including the faculty

members of emergency medicine department, the chief of ED, nursing system supervisor, ED in-charge manager, faculty members of some other disciplines, residents, nurses, laboratory and radiology technicians was formed. In this panel semi-structured and open questions were asked from the participants. All the interviews were recorded by obtaining consent from the interviewee. Then the interviews were converted to text, the text was studied by 2 independent project participants and various themes were coded separately and then compared. After agreeing on the categorized themes, each group of themes were coded again and the texts were assessed once more and out of the text, effective factors of staying more than 12 hours in ED mentioned by the interviewees was extracted in each group. Then after thematic evaluation of opinions and coding of the themes extracted, the checklist of evaluating the causes of more than 12 hours stay in ED of Imam Khomeini Hospital was prepared. In the next stage, by daily visit to the ED of the studied hospital, profile of the patients who had stayed in the ED for more than 12 hours was evaluated and the variables determined in the checklist were assessed

Statistical analysis

In the checklist preparation phase, thematic analysis method was used. Data obtained from the checklists underwent statistical analysis after extraction. For description, proper distribution and central affinity indices and statistical tables and charts as well as chi-square test were used.

RESULTS

In the first phase of the study and by evaluating the viewpoints of the panel members, many cases were proposed as effective factors of more than 12 hours stay of patients in ED, which have been summarized in table 1. In the present study, 407 patients with the mean age of 54.07 ± 20.18 years (minimum 1 and maximum 113 years) were studied, 270 (65.7%) of which were male. Respectively, 26 (6.4%) were admitted in triage level 1, 203 (49.9%) in triage level 2, 168 (41.3%) in triage level 3, 9 (2.2%) in triage level 4 and 1 (0.2%) in triage level 5. Mean time of ED processes in studied patients has been shown in table 2. Distribution of the frequency of each of the mentioned cases proposed by panel members, which could be quantitatively measured, has been reported in figure 1. Based on these findings, "services not wanting to transfer patients with decisions to the service" was the most common factor.

Table 1: Probable effective factors proposed by the expert panel regarding more than 12 hours stay of patients in the emergency department

Extracted probable effective factors
Patients referred from special centers such as jail, rehabilitation, and senior care
Presence of complicated patients with advanced underlying illnesses
Diabetic foot patients
Admission of elective patients via emergency department
Delay in performing radiologic processes
Performing routine tests by the nursing staff without an order from the physician
Order of tests without emergency indication by the residents
The time of sending the sample and response from laboratory
Delay in the initial visit in emergency department
Delay in responding to consultations
Problems in patient handover processes after dislocation to services
Time interval between decision making in emergency department and admission to other departments
Services not wanting to transfer patients with decisions to their service
Shortage of beds in specialized departments
Shortage of intensive care unit (ICU) beds
Shortage of coronary care unit (CCU) beds

Table 2: Mean time of various processes in emergency department (ED) in case of the studied patients

Time periods	Time (minutes)
Time of the initial visit of the patient by emergency medicine service	
Triage level 1	8.2 ± 22.3
Triage level 2	44.1 ± 36.9
Triage level 3	68.0 ± 54.5
Triage level 4	127.0 ± 270.9
Triage level 5	39.0 ± 39.0
Time of checking the orders by nurse	N/A
Time of responding to consultations	220.8 ± 267.5
Time from physician's visit to sending samples from ED	80.2 ± 98.4
Time interval between sending samples and receiving results	165.7 ± 84.7
Total time from physician's visit to receiving test results	245.9 ± 76.4
Mean time to reach a decision in ED	490.7 ± 266.4
Time from discharge from ED to hospitalization in the department	1508.4 ± 1380.7

ED: emergency Department

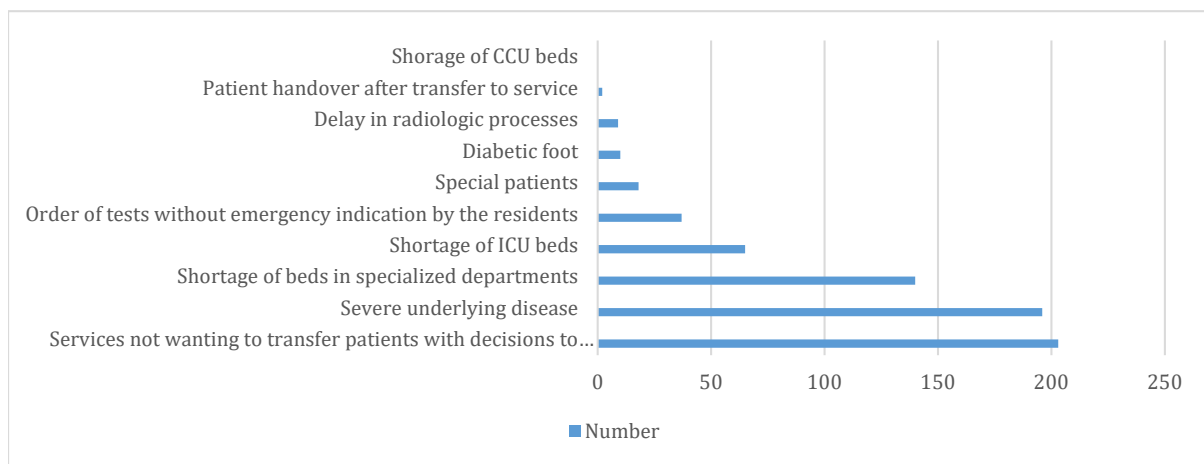


Figure 1: Distribution of the frequencies of probable quantitative effective factors proposed by the expert panel for more than 12 hours stay in emergency department.

DISCUSSION

Based on the findings of the present study, specialized services not tending to dislocate the patients that have been decided upon to their respective department, a considerable number of

complicated patients and patients with advanced underlying illnesses among those presenting to ED, shortage of beds in specialized departments and ICU, delay in performing consultations from specialized services, and delay in sending the

samples by nurses and delay in the laboratory sending the test results were the most common causes affecting more than 12 hours stay of patients in the studied ED.

Input

In this section, the factors that affect the input of patients to ED are introduced. In contrast to hospitalization departments, which have a pre-determined capacity, EDs usually have to admit patients more than their capacity, which in turn leads to overcrowding of the department (12). In this regard, many factors are effective. For instance, it is repeatedly seen that patients hospitalized in the hospitals of other cities, after performance of necessary diagnostic measures and despite the possibility of following the treatment process in the same city, leave the first treatment center and are discharged against medical advice and present to EDs of referral centers, including the studied hospital without prior coordination at any time of the day, hoping to find more equipment and better treatment. This not only causes overcrowding in the ED, but also leads to waste of time and money for both the healthcare system and the patient.

The studied hospital is considered a referral center of patients from special centers such as jails, rehabilitation, and etc. These patients are kind of considered difficult patients too, and in addition to the common diagnostic and treatment measures, they need to undergo special official processes after decision making, which lead to prolonged stay in ED. However, contrary to expectation, the number of patients referred from special centers was not significant in the present study.

Unfortunately, the perception of visitors and even the physicians of other departments from ED is wrongly a place that processes are done more rapidly; however, ED is a place for providing service to patients whose diagnostic and treatment interventions has priority over others. Yet, due to the wrong viewpoints it has been seen that non-emergency patients have come to ED since no bed was available in other departments and tending to their requirements inflicts more burden on the worn-out ED. Admission of elective patients to ED was among the topics emphasized by the expert panel of this study, but fortunately considering the performance of emergency medicine service in recent years, coordination of management and proper triage of the patients, this problem was not seen in this study.

Throughput

In this section, factors that delay decision making regarding patients in ED are discussed. Asking for

numerous non-emergency consultations and paraclinical diagnostic tests without emergency indication exerts an undeniable effect on elongation of patients' stay in ED and these factors have been emphasized in many studies (10, 13, 14). Preparation and execution of defined treatment protocols might reduce these orders to some extent. It should be noted that although delay in performing radiologic processes was not a common factor resulting in prolonged stay of patients in ED in the present study, the considerable number of non-necessary orders definitely exerts an effect indirectly.

Another factor emphasized in the expert panel was performance of routine tests without physician's order by the nursing system as well as ordering tests without emergency indications by the residents. Yet, since the results of other tests was received at the same time that the results of the tests ordered by the physician was received, it had no direct effect on the time of decision making and prolonged patient stay, but it led to an increase in the laboratory's workload and its indirect effects are undeniable.

Among the patients whose decision making is delayed are complicated cases with advanced underlying and chronic illnesses (13, 15). Among the most common ones are diabetic foot patients. Although they made up a small portion of patients with prolonged stay in the studied ED, considering the nature of the disease and its dependence on several specialty services including orthopedics, vascular surgery, internal medicine and infectious diseases they have a special situation, which makes decision making for them difficult.

Output

In this section, factors that affect the output of patients from ED are discussed. As mentioned before, one of the most common causes of prolonged stay of the patients in ED is other services not wanting to transfer the emergency patients hospitalized in their service to their own respective departments. These patients are visited by the lowest order of residents after moving from ED service to other services and either their lack of authority to order for hospitalization in the department or not wanting to due to the patient being critically ill and wanting to use the services of ED can cause this problem. Because as long as the patients are present in the ED, at the time of change in vital signs all the necessary treatment measures are done by the emergency medicine service and the residents of other services are not required to rapidly attend by the patient's bedside.

One justification for not dislocating the patients

with a decision from ED to other specialist departments is lack of empty beds, which can be due to the scarcity of beds dedicated to emergency patients in comparison to elective patients, tendency of services to hospitalize elective patients instead of emergency patients or delay in discharge of other patients from specialized services or shortage of beds in ICU (16).

The considerable point in the present study was that there was no patient with acute coronary syndrome who was not dislocated to coronary care unit (CCU) or stayed for more than 12 hours in the ED, which indicates the proper management and performance of the cardiac team of the hospital. Therefore, removing the obstacles to dislocation of the patients from ED to other wards on one hand and standardizing and accelerating the process of tending to the patients in this department and avoiding non-emergency activities on the other are effective in decreasing the duration of patients' stay in ED. It is interesting that stay of patients in ED seems to be directly correlated with their total duration of hospital stay (17-19). Therefore, solving the problems related to ED affects beyond the ED and knowing this can emphasize the importance of this matter for authorities more than before.

Limitations

Performance of this project was limited to one ED and was a cross-sectional study, and the results might not be generalizable. In addition, all the extracted factors discussed in the expert panel could not be evaluated. Additionally, during the assessment performed, mean time of the initial visit by emergency medicine service was significantly higher than the standards. This delay in the initial physician visit could be due to the problems in the process of profile registration and absence of history taking and clinical examination

REFERENCES

1. Hoot NR, Aronsky D. Systematic review of emergency department crowding: causes, effects, and solutions. *Ann Emerg Med.* 2008;52(2):126-36. e1.
2. Bernstein SL, Aronsky D, Duseja R, Epstein S, Handel D, Hwang U, et al. The effect of emergency department crowding on clinically oriented outcomes. *Acad Emerg Med.* 2009;16(1):1-10.
3. Ackroyd-Stolarz S, Guernsey JR, Mackinnon N, Kovacs G. The association between a prolonged stay in the emergency department and adverse events in older patients admitted to hospital: a retrospective cohort study. *BMJ Qual Saf.* 2011;20(7):564-9.
4. Momeni M, Vahidi E, Seyedhosseini J, Jarchi A, Naderpour Z, Saeedi M. Emergency Overcrowding Impact on the Quality of Care of Patients Presenting with Acute Stroke. *Adv J Emerg Med.* 2018;2(1):e3.
5. Hashemi B, Baratloo A, Forouzafar MM, Motamedi M, Tarkhorani M. Patient satisfaction before and after executing health sector evolution plan. *Ir J Emerg Med.* 2015;2(3):127-33.

time in the profiles and calculation of physician's order registration instead of the initial visit of the physician. Unfortunately, after assessing the profiles, all the nurses had recorded the time of initial physician visit the same as the time of performing the physician's orders and the recorded times are therefore not real.

CONCLUSIONS

In the present study, specialized services not tending to dislocate the patients that have been decided upon to their respective department, a considerable number of complicated patients and patients with advanced underlying illnesses among those presenting to ED, and shortage of beds in specialized departments and ICU, were the most common causes affecting more than 12 hours stay of patients in the studied ED.

ACKNOWLEDGEMENTS

We would like to thank all the staff of Imam Khomeini Hospital Complex, that participated in this study. This article has been extracted from Dr. Roya Esmaeili's thesis for emergency medicine residency at Tehran University of Medical Sciences, Tehran, Iran.

AUTHORS' CONTRIBUTION

All the authors met the standards of authorship based on the recommendations of the International Committee of Medical Journal Editors.

CONFLICT OF INTEREST

None declared.

FUNDING

None declared.

6. Rahmati F, Gholamalipoor H, Hashemi B, Forouzanfar MM, Hosseini F. The reasons of emergency department patients' dissatisfaction. *Ir J Emerg Med.* 2015;2(2):59-63.
7. Hashemi B, Baratloo A, Rahmati F, Forouzanfar M, Motamedi M, Safari S. Emergency Department Performance Indexes Before and After Establishment of Emergency Medicine. *Emergency.* 2013;1(1):20-3.
8. Parker B, Marco C. Emergency department length of stay: accuracy of patient estimates. *West J Emerg Med.* 2014;15(2):170-5.
9. Nasr-Esfahani M, Esmailian M, Nasri M. Causes of prolonged length of stay for patients referred to the emergency department; a cross-sectional study. *Ir J Emerg Med.* 2014;1(1):45-9.
10. Salehi T, Nayeri N, Rashidian A, Mohammadi E. Investigating the effect of clinical governance approach on patients' length of stay in emergency department: an action research study. *Acta Med Iran.* 2014;52(2):137-45.
11. Kreindler SA, Cui Y, Metge CJ, Raynard M. Patient characteristics associated with longer emergency department stay: a rapid review. *Emerg Med J.* 2016;33(3):194-9.
12. Bernstein SL, Asplin BR. Emergency department crowding: old problem, new solutions. *Emerg Med Clin North Am.* 2006;24(4):821-37.
13. Yoon P, Steiner I, Reinhardt G. Analysis of factors influencing length of stay in the emergency department. *CJEM.* 2003;5(3):155-61.
14. Li L, Georgiou A, Vecellio E, Eigenstetter A, Toouli G, Wilson R, et al. The Effect of Laboratory Testing on Emergency Department Length of Stay: A Multihospital Longitudinal Study Applying a Cross-classified Random-effect Modeling Approach. *Acad Emerg Med.* 2015;22(1):38-46.
15. Casalino E, Wargon M, Peroziello A, Choquet C, Leroy C, Beaune S, et al. Predictive factors for longer length of stay in an emergency department: a prospective multicentre study evaluating the impact of age, patient's clinical acuity and complexity, and care pathways. *Emerg Med J.* 2014;31(5):361-8.
16. Hillier DF, Parry GJ, Shannon MW, Stack AM. The effect of hospital bed occupancy on throughput in the pediatric emergency department. *Ann Emerg Med.* 2009;53(6):767-76. e3.
17. Rathlev N, Obendorfer D, White L, Rebholz C, Magauran B, Baker W, et al. Time series analysis of emergency department length of stay per 8-hour shift. *West J Emerg Med.* 2012;13(2):163-8.
18. Liew D, Liew D, Kennedy MP. Emergency department length of stay independently predicts excess inpatient length of stay. *Med J Aust.* 2003;179(10):524-6.
19. Singer AJ, Thode Jr HC, Viccellio P, Pines JM. The association between length of emergency department boarding and mortality. *Acad Emerg Med.* 2011;18(12):1324-9.