REASONS FOR DELAY IN INPATIENT ADMISSION AT AN EMERGENCY DEPARTMENT

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Objective: This study highlighted the reasons which contributed to longer stay of patients in Emergency Department (ED) who were advised admission. **Methodology:** This study was conducted from August 4 to 11, 2004G as a retrospective review of the ED cards of patients admitted to inpatients wards of Al-Noor Specialist Hospital, Makkah, Saudi Arabia. The demographic data, doctors & nurses notes with their timings were reviewed. The maximum consumed time by a reason was considered as the main reason of delay for that subject. The delayed patients were divided into Group A and B, delayed before and after admission was advised, respectively. Prolonged length of stay (Delay) in ED was defined as stay longer than 2 hours after patient's arrival in ED until they were received to wards. **Results:** Out of total 4876 visits during study period, 355 (7.3%) patients were admitted, and 238 (67%) were delayed. Age group 13–30 years was common in delayed 78 (32.8%) and not delayed 56 (47.9%) subjects. The mean length of stay of delayed subjects was 256 minutes. Group A 146 (61.4%) had more subjects than group B 92 (38.6%) ($p<0.001$). Fifty eight (39.7%) patients stayed between 2-3hours in Group A vs. B 23 (25%) (OR 2, 95% CI 1.1–3.5). Common reason of delay in Group A was multiple consultations with further investigations 70 (48%) ($p<0.001$) while file making process was common 40 (43.5%) in group B ($p<0.001$). **Conclusions:** Out of admitted patients 67% were delayed mainly due to late advised admission with major reason of delay were multiple consultations.
Keywords: Emergency Department, Admission, Delay, Reasons

INTRODUCTION

Emergency Departments (EDs) provide an extraordinary important public service mission by providing emergency care 24 hours a day without discrimination by social or economic status. One of the key foundations of EDs is the ability and expectation to provide immediate access and stabilization for patients with medical and surgical emergencies.[1] EDs overcrowding is a serious and growing problem throughout the world[2] and almost half of inpatients are admitted through the EDs while its satisfaction is complicated by the high volume of patients, time consuming queues, wide variation in patient complaints, and complexities of acute care.[3] For several years hospital managers were under pressure to increase bed capacity and reduce occupancy rates to improve operational efficiency but public anxiety has arisen when patients were subjected to extended delays in ED in the presence of inpatient beds.[4] Emergency caregivers experience considerable new challenges to the provision of competent, compassionate care.[5] Patients who presented to EDs often faced long waiting times to be treated and those who required admission faced even longer waiting time to get access to an inpatient bed.[6,7]

This study is dissimilar with previous studies because of its extensive description by dividing delayed subjects by the time of advised admission. Cautious review of data makes it more explanatory regarding different factors of delay. On the other hand we categorized the diagnosis according to 1CD-10 Codes which also makes this study unique. In this study our key focus was to identify and categorize all possible reasons of longer stay (>2 hours) in ED by patients who came to our ED, stayed and finally planned or decided to be admitted (transferred) in wards by respective specialty personnel.

METHODOLOGY

Study Design: This study was conducted as a retrospective review of ED cards of patients of all specialties who had been admitted from ED during the one week of Jamadu-Al-Thani 1425 H (corresponding to August 4 to 11, 2004) to examine the reasons of prolonged stay (delay) in ED before shifted to inpatient wards.

Study Settings: This study was performed at the ED of a 520 bed tertiary care referral teaching hospital in Makkah, Saudi Arabia, the Al-Noor Specialist Hospital with an annual of about 229,200 ED visits. The ED typically contains 72 nurses and a total of 40 doctors, including consultants, specialists and residents. ED doctors could call resident or specialist of the day or on call (ROD, SOD) of all specialties, to take second opinion for the patients with expected admissions or complications. Only the (SOD) could admit a patient as per hospital policy and depending upon the patient's condition.

Al-Noor Hospital's ED is fully equipped with a total department area of 2315 m^2 having 54

beds in different areas including Triage Area, Adult Care Area (ACA), Ob/Gyne, Critical Care Area (CCA) and Paediatrics Care Area (PCA). This ED also has an Emergency Pharmacy, Radiology Department and Laboratory. There is a surgical facility with an Operation room, and ENT, Eye and Dental procedure rooms are also present for emergency patients.

For this study, prolonged length of stay (delay) in ED was defined as 'time duration (stay) of patients longer than 2 hours after their arrival in ED until they were received to inpatient wards'. 'The better mathematical model showing ED activity can be possible by counting the amount of time taken by each staff at each stage'.[8]

All patients admitted through the ED to inpatient wards were included and had been registered and given an ED card bearing the date, time of arrival and other demographic data, as soon as they entered the department. The medical research officer abstracted the information from the ED cards in collaboration with medical record department. The criteria for information to be collected included the following:

1-Demographic data

2-Patients arrival time and date in ED

3-Nurses and doctors notes with the timings of: *(a)* different consultations, *(b)* treatment given, *(c)* sampling, *(d)* arrival of results of investigations, *(e)*advice of admissions, *(f)* communication for inpatient beds availability, *(g)* contact for admission file process, *(h)* departure time of the patient from the ED and *(i)* arrival time of patients in the wards.

The age groups were divided into 0–12, 13–30, 31–50, 51–70, >70 years. Similarly subjects were divided into gender (M/F) and nationality (Saudi/Non-Saudi).

The exact time when subjects were advised admission by respective specialty personnel in ED was noted and considered as a dividing instrument or line for delayed patients into two groups. Group A composed of those delayed subjects whom admission was advised at the time when each patient already spent more than half of his total time in ED. Group B composed of those delayed subjects whom admission was advised and then each patient stayed longer than half of his total time in ED.

Total time in ED was defined as 'Time of presentation of patient to ED as mentioned in his ED card until time of receipt of that patient by the inpatient nurse in inpatient ward'. This grouping was done because factors causing delay of subjects in ED in both groups was different. These different reasons/factors of delay were reviewed for

example, multiple consultation (a complex patient seen by ED resident, specialist and consultant as well as on call doctors if required), file making process especially PSP 'private services programme' (PSP files were prepared for all admitted non-Saudis necessarily and Saudis who desired to be admitted under private services), late arrival of investigation reports (any result report came after >half hour of its usual time which based upon inquiry from laboratory staff about time taken by each emergency investigation) etc. As the time duration taken by each reason was considered, but the reason that consumed maximum time was considered as main reason of delay for that subject. The admitting diagnosis with ICD-10 Codes was sorted out from computerized hospital information system.

This study had already been discussed in monthly meeting of hospital board and granted permission for its publication.

Date was subjective to descriptive analysis with mean and median were found for continuous variables. Odds ratio with 95% confidence interval was calculated to compare the detail of proportion difference of subjects stay in ED between two groups. Student's t-Test was applied to measure the difference in duration between both groups (continuous data). Chi-square test was applied categorical data. p-value <0.05 was considered as significant.

RESULTS

During the study period out of total patients 4876 who visited the ED only 355 (7.3%) were admitted with delay of 238 (67%) ($p<0.001$). Among delayed patients, males 135 (56.7%) were more than females. Saudi nationals and 13–30 years made the prominent groups among all admitted patients (Table-1).

Table-1: Demographic Data (n=355)

Variables		Stay ≤2 hours n (%)	Stay >2 hours n (%)
Age in groups	0-12	16 (13.7)	48 (20.2)
	13-30	56 (47.9)	78 (32.8)
	31-50	29 (24.8)	46 (19.3)
	51-70	14 (12)	50 (21)
	>70	2 (1.7)	16 (6.7)
Sex	Male	35 (29.9)	135 (56.7)
	Female	82 (70)	103 (43.3)
Nationality	Saudi	93 (79.5)	188 (79)
	Non-Saudi	24 (20.5)	50 (21)
Total		117	238

The most common (depending on statistics) time duration in the ED for all admitted patients was 3–4 hours after arrival 86 (24.2%) followed by the 2nd to 3rd hour 81 (22.8%). The mean duration of stay of all subjects was 191

minutes and median length of stay was 165 minutes. On the other hand majority of patients from Group A 58 (39.7%) spent 2–3 hours in ED than Group B 23 (25%) (OR 2, 95% CI 1.1–3.5). But patients from Group A stayed less often in ED between 4–5 hours (OR 0.4, 95% CI 0.2–0.9) and again 6–7 hours (OR 0.4, 95% CI 0.1–1.6) than Group B. The mean stay of delayed subjects was 256 minutes with Group A 264 minutes which was not significantly different from Group B 249 minutes (p>0.05) (Table-2).

Concerning the reasons for delay, the most common reason in Group A was multiple consultations with further investigations 70 (48%) followed by critical care management 30 (20.5%) (p<0.001). The least frequent cause was poor response to initial ED management 11 (7.5%). Likewise, file making process 40 (43.5%) was most frequent reason of delay in Group B followed by investigations done on the way to wards 25 (27.2%) (p<0.001) (Table-3).

Table-2: Patients' Time Duration According to Delay (>2 hr) (n=238)

Time Spent (Hrs)	*Group (A) n (%)	†Group (B) n (%)	‡OR 95% CI
2–3	58 (39.7)	23 (25)	2 (1.1–3.5)
3–4	51 (34.9)	35 (38)	0.9 (0.5–1.5)
4–5	17 (11.6)	21 (22.8)	0.4 (0.2–0.9)
5–6	13 (8.9)	6 (6.5)	1.4 (0.5–3.8)
6–7	3 (2)	5 (5.4)	0.4 (0.1–1.6)
7–8	2 (1.4)	1 (1.1)	1.2 (0.1–14)
8–9	2 (1.4)	1 (1.1)	1.2 (0.1–14)
Total	146 (100)	92 (100)	

*Group (A)=Patients who remained in ED >half of total time before admission advised. †Group (B)=Patients who remained in ED >half of total time after admission advised. ‡Odds Ratio, 95% Confidence Interval

Table-3: Reasons of Delay in ED (n=238)

Groups	Reasons/factors	n (%)	¤p-Value
Group A n=146	Multiple consultations with further investigations advised	70 (48)	
	Critical care management	30 (20.5)	
	Multiple assessment in different ED areas followed by late arrival of SOD*	20 (13.7)	<0.001
	Late arrival of investigations reports	15 (10.3)	
	Poor patients response to initial ED management	11 (7.5)	
Group B n=92	File making process	40 (43.5)	
	Investigations done on the way to wards	25 (27.2)	<0.001
	Patients personal & economical constraints	15 (16.3)	
	Waiting for vacant beds	12 (13)	

*Specialist Of The Day/On call. ¤Chi-square test

Most prominent admitting diagnosis among delayed patients was acute coronary syndrome 15 (6.3%) followed by acute appendicitis 14 (5.8%). Delayed subjects were mostly suffered from diseases of the circulatory system 35 (14.7%) with ICD-10 Code (I00-I99) followed by external causes of morbidity and mortality (V00-Y98), i.e., 33 (13.9%). Similarly the cases of Ob/Gynae were 15 (6.3%) (Table-4).

Table-4: Delayed patients' Admitting Diagnostic Groups with ICD-10 Codes (n=238)

S. No.	Diagnostic Groups	ICD-10 Codes	n (%)
1.	Diseases of circulatory system	I00-I99	35 (14.7)
2.	External causes of morbidity and mortality	V00-Y98	33 (13.9)
3.	Diseases of digestive system	K00-K93	32 (13.4)
4.	Symptoms, signs and abnormal clinical laboratory findings, not elsewhere classified	R00-R99	29 (12.2)
5.	Diseases of blood and blood forming organs and certain disorders involving the immune mechanism	D50-D89	18 (7.6)
6.	Diseases of genitourinary system	N00-N99	17 (7.1)
7.	Pregnancy, childbirth and puerperium	O00-O99	15 (6.3)
8.	Endocrine, nutritional and metabolic diseases	E00-E90	13 (5.5)
9.	Injury, poisoning and certain other consequences of external causes	S00-T98	11 (4.6)
10.	Diseases of respiratory system	J00-J99	8 (3.4)
11.	Diseases of skin and subcutaneous tissues	L00-L99	6 (2.5)
12.	Neoplasm	C00-D48	5 (2.1)
13.	Diseases of nervous system	G00-G99	3 (1.3)
14.	Certain conditions originating in the perinatal period	P00-P96	3 (1.3)
15.	Diseases of musculoskeletal system and connective tissues	M00-M99	3 (1.3)
16.	Diseases of ear and mastoid process	H60-H95	2 (0.8)
17.	Certain infectious and parasitic diseases	A00-B99	2 (0.8)
18.	Congenital malformation, deformations and chromosomal abnormalities	Q00-Q99	2 (0.8)
19.	Diseases of eye and adnexia	H00-H59	1 (0.4)

DISCUSSION

Our study analysed the possible reasons that affected ED performance in the form of delaying patients from being admitted to inpatient wards.

Regarding working definition of delay, gender, emergency department length of stay (EDLOS) and factors of delay, our study is comparable to the studies of Liew[9], Miro[10], and Rehmani[11]. Working definition of delay in our study was patient's stay >2 hours differed from Rehmani's study where it was the stay in ED being longer than 6hours. In our study 47.9% of the patients were males as in Liew's study. Regarding the duration of stay in the ED 80% cases were admitted in less than 4 hrs, 19.2% admitted between 4–8 hours and only 0.8% admitted after 8 hours after arrival to the ED, which is much different than Liew's study. Liew's study showed mean ED length of stay (EDLOS) 7.98 hours which was more than double than ours, i.e., 3 hours and 11 minutes.

Emergency department (ED) overcrowding is not clearly defined in the emergency medical literature. This lack of definition limits the ability to study the problem and develop effective solutions.[12]

Most of the factors responsible for delay in our study were same as in Miro's and Rehmani's studies, e.g., waiting for an on call doctor, time taken for investigations and results, file making process and delay due to financial and personal constraints. Waiting for inpatients beds by admission advised patients was the most common reason of delay in the ED in Rehmani's study, i.e., 33.3% but lesser in our study 12/238 (5%). Although we shared ED overcrowding of our 520 bedded hospital with that of another 500 bedded teaching hospital of Foster's study which had showed that 155 patients visited the ED per day with 19% admissions while we had 696 ED visitors (patients) each day and out of them 7.2% were admitted (and 92.8% discharged). Similarly, the median ED length of stay among all admissions in our study was 2 hours and 45 mins vs 5 hours and 54 minutes.[13] Our study focused on nine major factors of delay while Rehmani discussed only six and Miro described four. On the other hand admitting diagnosis was also discussed by Rehmani but we categorized them according to ICD-10 codes.

Multiple consultation as well as file making process caused most of subjects to delay, it may be due to lack of awareness about hospital policies by some of the staff due to their new arrival and initial assessment of patients by junior staff, e.g., the patient who required consultation from any specialty for admission had been seen first by ROD (resident on call) but he cannot advise admission according to hospital policy, so he page his (SOD) specialist on call to visit the patient in ED and advise admission if required. Probably by increasing the number of senior staff (specialists and consultants) especially in ED and enforcing them to do initial assessment of patients will lead to reduce duration of subjects in ED as well as overcrowding.

Delay due to sampling, investigations reports, and file making process especially PSP was most probably due to reduced staff in respective department during evening and night shifts. Delay due to personal reasons and financial constraints especially by the non-Saudi patients were because of costly treatment, lake of health insurance or any other free medical treatment facility by their employer. Late arrival of investigation reports probably due to ED overcrowding, might be it was due to the investigation burden by those ED visitors who admitted in ED for observation for short stays, investigated, not fulfilled the criteria of admission and then discharged.

Delay due to waiting for inpatients beds was a minor factor in our study, which is the major issue currently facing emergency medicine in Australia and the whole western world.[14] The ED length of stay ultimately affects the resources available for providing care to nearly arriving acutely ill patients.[15] The major solution to hospital access issues is to spend money and increase inpatient bed numbers by employing more staff. There is a clear need to reduce EDLOS for patients.[16]

Unnecessary delays are common and can be avoided by paying attention to the facilities, administration and improving development of staff. Waiting time in the ED will change as definitive treatments by emergency doctors increase. Critically ill patients may spend a substantial amount of time in the ED, because typical intensive care procedures are commonly performed. Importantly, these procedures may also reduce patients' morbidity and mortality related to delay of definitive treatment.

Although severity, urgency and complexity of illness were significant potential confounders but we did not focused upon their correlation with emergency department length of stay (EDLOS) because of lake of respective data but these would be considered in future studies. The difference in estimates could be possible among different months because this study was conducted in Jamadu-Al-Thani not in busiest months, i.e., Ramadhan and Dhu Al-Hijjah when Makkah as well as its hospitals were overcrowded. We used data of short duration from one tertiary care referral teaching hospital and perhaps the results would be beneficial to other similar

hospitals and non-tertiary care hospitals. However, almost the reasons of delay would be applicable to most of the hospitals; but if we used the large size and duration of study then it would provide high precision in estimates. The paper did not provide data on the outcome of admitted patients, thus the overall impact of delay in ED on the admitted patients could not be counted. We did not analyse trend of delay as well as employees strength in different duty shifts in laboratory as well as radiology department which might expose some other factors of delay. Similarly ED patients who stayed in observation areas for investigations, and then discharged, another confounder factor, were not considered. The comparison between delayed and not delayed subjects would be discussed in future studies because this study only focused upon delayed patients.

CONCLUSIONS

Out of the admitted patients, majority were delayed in the ED. Most patients remained in the ED more than half of the total time before admission was advised. The main reason of delay was multiple consultations followed by file making process, critical care management, investigation done on the way to wards & multiple assessments in different ED areas and lesser number were delayed due to poor response of patients to ED management. Diseases of the circulatory system were most prominent diagnostic group among delayed subjects. Decreasing delays in our ED will involve improving or changing a number of factors.

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