



A STUDY ON THE OPERATION OF THE EMERGENCY DEPARTMENT, WITH A FOCUS ON THE AMOUNT OF TIME ALLOCATED TO EACH ACTIVITY IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Emergency Department specializes in providing episodic & primary acute care to patients arriving at the ED. The study mainly focuses on the existing functioning of the emergency department in the hospital and assesses the time taken for the management of patients in the department. A pilot study was conducted to determine the feasibility of the study and to help with the process of standardization of various activities performed in the ED. The tools used for data collection were observation diary and checklist and the methods of data collection were observation and discussion. The standard time for various specialties was found and it was compared with the actual time to rule out the deviation. The results showed that the Pulmonology specialty had the greatest deviation from the standard time, which was 1 hour 56 minutes and 35sec and the orthopedics specialty showed the least deviation which was 30 minutes and 55 sec. The major causes of deviation include: -32% of the samples showed delay due to the shortage of staff to transfer the patients to the concerned department and 26% of the samples were delayed due to the waiting time for investigations like MRI and CT scans. The study helped develop a whole new perspective on the ED and the care provided by the various departments for the patients visiting the ED.

KEYWORDS : ED, functioning, Standardization, Deviation

INTRODUCTION

One of the biggest issues facing society this decade is healthcare due to rising life expectancy and changing living conditions. Because of this, most healthcare systems struggle mightily to deliver higher-quality care on schedule [1][2]. The emergency department (ED) is a vital link in the healthcare system that provides immediate access to medical care. An emergency patient's prognosis and long-term results can be greatly impacted by prompt and efficient care [3][4]. As such, the efficacy and reputation of a hospital are significantly influenced by the caliber and efficiency of care given in the emergency department [5][6].

The emergency department plays a crucial role in the healthcare arena. As it is one of the areas in the hospital providing quick & timely service to the patients & the emergency care that is given on time can make a huge difference in the prognosis of a patient in the long run. Hence the quality & timely delivery of care provided plays an enormous role in determining the reputation of a hospital.

Before the turn of the 20th century, every hospital had a "accident room" that was largely used to treat injured patients. These rooms progressively developed into what are currently known as emergency departments, serving a wider range of medical issues in the process [7]. Following the UK's Platt Committee's 1961 recommendation that the term "Accident & Emergency Department" be used, the shift from accident rooms to full-fledged emergency departments got underway. The way emergency services are run and organized has advanced significantly as a result of these modifications [8][9].

A few committees have reaffirmed the Central Council of Health's 1963 proposal that all state governments in India set up emergency medical services in large cities and towns [10][11]. Since then, emergency departments (EDs) have expanded to become "mini hospitals" that handle a variety of acute medical problems [12]. The fact that delays in emergency care can have serious consequences, such as a patient losing a limb or even dying, emphasizes the significance of this service and poses serious issues for healthcare management as well as a hospital's reputation [13][14].

One of the most delicate and stressful parts of a hospital, from an administrative standpoint, is the emergency department. It can set off complicated domino effects that affect both patient

care and hospital operations as a whole [15][16].

The importance of this service lies in the fact that this is the most crucial & vital aspect of health care. It is perceived by the patient & the attendants as an 'emergency which calls for urgent action. Delay in necessary action means loss of a patient's limb or even death. This in turn can tarnish the image and reputation of the hospital and pose a tough time for health care. From an administrative point of view, it is one of the most stressful and sensitive areas, which can trigger off-chain reactions.

Specific Objectives

1. To analyze and record the time intervals related to every stage of the patient care process for specialty consultations to assess the Emergency Department's (ED) current workflow and efficiency. This covers the duration of the patient's initial registration through the end of the specialty consultation.
2. To look at the precise reasons behind the Emergency Department's (ED) specialty consultation process delays and evaluate the impact these delays have on the amount of time patients spend in the ED overall. This entails looking into the administrative and clinical elements that lead to delays.

Methodology

The research design used here is descriptive. Descriptive research is a type of research that describes the characteristics of the population or phenomenon studied. The patients registered to the ED were taken as the sample based on convenient sampling. Based on the specialty consultations available in the emergency department the departments obtained were Orthopaedics consultation, Surgery consultation, Cardiology consultation, Neurology consultation, Paediatric consultation, Pulmonology consultation, and ENT consultation. Since the observation could be done only over a period of 8 hrs, for a duration of 45 days, a total of 150 samples was collected from various departments which are 58 patients from orthopedics, 22 patients from pediatrics, 21 patients from general surgery, 17 patients from cardiology, 14 patients from neurology, 11 patients from pulmonology, and 7 patients from ENT selected as the sample size

Source of Data

- Primary Source

The patient registered in the ER and employees of all

departments coming in contact with the ED room care

- **Secondary Source**

ED registers, records, journals, magazines, website of the hospital

Pilot Study

A pilot study was conducted during the first week of data collection to analyze and correct the flaws in the prepared methodology and also for standardization of time taken for each activity performed on the patients registered in the ED. Standardization was done using 4 samples. The procedures or activities performed in the ED after a patient was registered in the ED were found out and listed down. The time taken for each of these activities was observed with the help of a watch and the average of the time taken for the 4 samples was taken as the standard time of each activity.

The activities in the ED included the following

Activities Observed

ACTIVITY 1: Receiving of the patient by the triage staff & history collection

ACTIVITY 2: Checking the vital signs.

ACTIVITY 3: Preparation of patient ED file

ACTIVITY 4: Consultation by doctors

ACTIVITY 5: Shifting to the concerned priority area according to triage

ACTIVITY 6: First aid medications

ACTIVITY 7: Consultation by MO

ACTIVITY 8: Investigations

ACTIVITY 9: carrying out the procedures or treatment prescribed by MO/cross-consultation information

ACTIVITY 10: Consultation by the concerned doctor of the department.

ACTIVITY 11: writing of consultation report

ACTIVITY 12: Carrying out of procedures prescribed by the doctor

ACTIVITY 13: Billing and payment/pharmacy

ACTIVITY 14: Waiting before getting transported to the concerned wards in case of admission into the inpatient unit or waiting time before leaving the ER.

Method of Data Collection

1. Discussion with Employees

A discussion was conducted with the ED in charge, the Head Of the Department, medical officers, public relations officers, and PREs to study the existing functioning of the ED and the activities carried out from the reception of a patient till the discharge from ED or admission.

2. Observation Method

The researcher used the observation method of data collection to obtain the time taken for various activities. The researcher observed the patients and the employees in the casualty to obtain various data about the study. An observation diary was used to record the observations done. Observation was done during the daytime over a period of 45 days. Samples were observed one after the other. Time taken for all the activities performed for the patients in the ED were found with the help of a watch and the time was recorded on the spot.

The observation method was also used to find out the reason for the deviation from standard time.

Tools of Data Collection

- **Observation Dairy**

The observation dairy consists of the date, duty shift, specialty consultation, and all the activities. All observations made by the researcher about the actual time taken for various activities were recorded with the help of a watch in the observation dairy, along with this causes of delay are also noted down.

- **Checklists**

A list of possible causes of delay from the time of registration

of the patient to the ED till discharge from ED or admission to the inpatient unit was prepared.

Processing of Data

- **Tabulation**

1. Table of activities showing the averages of standard time taken Department wise table
2. Table of activities showing the averages of actual time taken and the deviation from the standard time. Department wise table
3. Table containing the percentage analysis of causes of delay for consultation by specialty doctors and prolongation of the ED stay, if any.

- **Calculations**

- 1) Standard time: Ideal average time taken by the sample to complete each activity
- 2) Actual time: average time taken by the sample to complete each activity.
- 3) Deviation from time taken for the consultation process, if any
- 4) Percentage analysis of causes of delay for consultation by specialty doctors and prolongation of the ER stay, if any.

Limitations of the Study

During the study, there was a situation of mass causality the number of patients was more than expected and the patient's activity flow couldn't be observed. During rush in ED, it is difficult to observe the activity flow. The data couldn't be collected during the night, the patients who arrived from 5 pm to 9 am were not observed.

RESULTS AND FINDINGS

The ED of the Hospital has five divisions which are the triage area, priority 1 red zone, priority 2 yellow zone, priority 3 orange zone, and priority 4 green zone. ED provides round-the-clock service to acute patients.

The study shows the standard time taken for various activities performed in the ED of the Hospital

Total standard time taken by various specialties are ortho: 2 hours 14 minutes and 19 seconds, cardiology: 2 hours 07 minutes and 53 seconds, pediatrics 1 hour 58 minutes and 53 seconds, general surgery: 1 hour 54 minutes and 12 seconds, pulmonology: 2 hours 35 minutes 09 seconds, neurology: 2 hours 08 minutes 53 seconds, and ENT: 2 hours 15 minutes and 58 seconds.

The actual time taken for the various activities performed in the ED of the hospital is as follows:

The total actual time taken by various specialties are ortho: 2 hours 45 minutes and 14 seconds, cardiology: 3 hours 32 minutes and 24 seconds, pediatrics 3 hours 34 minutes and 04 seconds, general surgery: 3 hours 24 minutes and 35 seconds, pulmonology: 4 hours 24 minutes 35 seconds, neurology: 3 hours 46 minutes 24 seconds, and ENT: 3 hours 16 minutes and 47 seconds.

There was a total of 14 activities. The deviation from actual time from standard time for various activities in different specialties is as follows:

- In orthopedics cases the highest deviation was seen in activity 12, which is carrying out the procedures prescribed by the specialty doctor the total deviation or prolongation of stay of the patient in ED extends up to 30 minutes.
- In cardiology cases, the highest deviation was seen in activities 8 and 13, which are investigations billing and pharmacy the total deviation from standard time is seen by 1 hour 24 minutes, and 30 seconds.
- In pediatric cases the highest deviation was seen in activities 2 and 3, which is checking vitals and preparation of the ED file, the total deviation observed was 1 hour 6

minutes, and 11 seconds.

- In general surgery cases, the highest deviation was seen in activities 8,7, and 13, which are investigations, consultation by MO, and billing and pharmacy the total deviation from standard time is seen by 1 hour 18 minutes, and 26 seconds.
- In Pulmonology cases the highest deviation was seen in activities 10 and 12, which is a consultation by a specialty doctor and carrying out the procedures prescribed by the pulmonologist. The total deviation from standard time is seen by 1 hour 56 minutes and 35 seconds.
- In Neurology cases the highest deviation was seen in activity 8, which is the time consumed for investigations. The total deviation from standard time is seen by 1 hour 41 minutes and 40 seconds.
- In ENT cases the highest deviation was seen in activities 3 and 8, which is the preparation of ED files and investigations. The total deviation from standard time is seen by 1 hour and 49 seconds.
- The Pulmonology specialty shows the greatest deviation from the standard time was 1 hour 56 minutes and 35 seconds and the orthopedics specialty shows the least deviation was 30 minutes and 55 seconds.

The most common cause for the prolongation of patients in ED is observed as the shortage of staff to transfer the patient to the concerned department which is 32% and another reason is the waiting time for investigations like CT and MRI which is 26%. Overcrowding, staff shortage and lack of ICU beds or beds in the concerned department are also causes for the prolongation of the stay of patients. Junior doctors wait for senior doctor's advice cause for delays in means of specialty consultation by 15.3%.

Table No:1 Department-wise Standard Time Taken For Activities 10-12

Activities	Cardio	Ortho	Pedia-trics	Neuro	General Surgery	Pulmonology	ENT
Act10	00:16:17	00:08:14	00:20:29	00:19:24	00:12:31	00:27:41	00:22:56
Act11	00:06:34	00:05:35	00:08:44	00:09:01	00:09:08	00:11:35	00:08:30
Act12	00:25:52	00:24:05	00:16:15	00:25:02	00:13:22	00:36:43	00:25:22

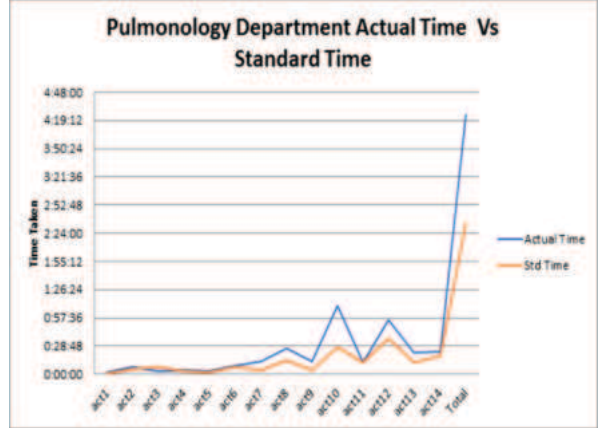


Chart No:2 Actual Time Vs Standard Time Of Pulmonology Department

Interpretation: In Pulmonology cases the highest deviation was seen in activities 10 and 12, which is a consultation by a specialty doctor and carrying out the procedures prescribed by the pulmonologist. The total deviation from standard time is seen by 1 hour 56 minutes and 35 seconds, this is the department that shows the maximum deviation from the standard time and it is observed that Pulmonology patients wait a long time for specialty consultation and carrying out the procedures prescribed by the pulmonologists causes a prolonged stay for patients in ED.

Table No.2 Reasons For Delay In Specialty Consultation By Doctor And Prolongation Of The Patient In ED

Reasons	Number of cases	Percentage
1. Awaiting bed allocation (no free bed/bed making) in the ED.	14	9.33%
2. Long time for file making due to missing information.	2	1.33%
3. Waiting for investigations to be carried out like radiology.	39	26%
4. Additional lab or radiology investigations.	22	14.66%
5. Patient unresponsive to initial ED management.	0	0%
6. Multiple ED consultations or overcrowding.	28	18.66%
7. Doctors are not attending the call from the ED/ unavailable	2	1.33%
8. Urgent ward issues that doctors have to attend to.	0	0%
9. ED doctor unavailable to commence assessment.	2	1.33%
10. Doctors in surgery/OT	1	0.66%
11. Doctors are with other patients in the ED	8	5.33%
12. Shortage of staff nurses	18	12%
13. Doctors consult the patient at op as they do not come to the ED	4	2.66%
14. Multiple consultations for a single patient.	6	4%
15. Personal & financial constraints of the people.	8	5.33%
16. Others: - complex patient, desired investigation unavailable,	23	15.33%
17. Machine complaints.	0	0%
Reasons for delay in transfer to the inpatient unit		

Ortho Department -Actual Time vs Standard Time

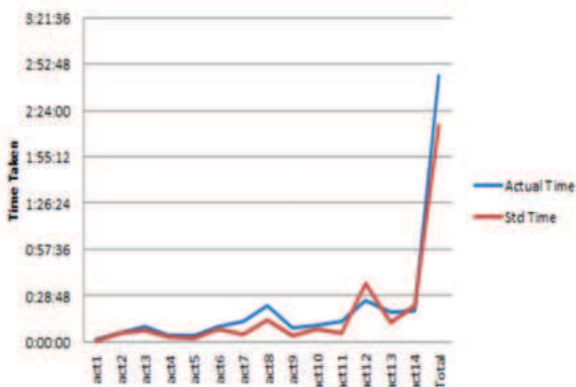


Chart No.1 Actual Time Vs Standard Time Of Orthopedics Department

Interpretation: In orthopedics cases, the highest deviation was seen in activity 12, which is carrying out the procedures prescribed by the specialty doctor the total deviation or prolongation of stay of the patient in ED extends up to 30 minutes which may be due to several reasons which are charted above, since this department shows the minimum deviations from total standard time.

18. Lack of bed in the concerned inpatient unit	18	12%
19. Shortage of staff to transfer the patient to the concerned department	48	32%

The most common cause for the prolongation of patients in ED is observed as the shortage of staff to transfer the patient to the concerned department which is 32% and another reason is the waiting time for investigations like CT and MRI which is 26%. Overcrowding, staff shortage, and lack of ICU beds or beds in the concerned department also cause prolongation of the stay of patients. Junior doctors wait for senior doctor's advice cause for delays in means of specialty consultation by 15.3%.

Suggestions

The research conducted has been instrumental in identifying and ruling out several potential causes of delays and inefficiencies in various activities within the Emergency Department (ED). The following suggestions are designed to address these identified issues and enhance the overall efficiency and effectiveness of the ED operations:

1. Addressing Staff Shortages:

The current staffing situation in the ED at the Hospital is characterized by a minimum number of staff nurses. This shortage is likely to impact the efficiency of the department and may lead to delays in providing timely care to patients. To address this issue, it is essential to increase the number of staff nurses on duty. A more robust staffing model will ensure that there are enough nurses available to manage the high volume of patients, streamline processes, and deliver prompt care. This approach will help in reducing waiting times and improving patient outcomes.

2. Appointment of Dedicated Shifting Staff and Provision of Shifting Equipment:

One significant challenge observed is the delay patients experience while waiting for shifting staff and necessary equipment such as trolleys and wheelchairs. To mitigate these delays, it is recommended to appoint or assign dedicated staff members specifically for patient-shifting duties in the ED. Additionally, providing a sufficient number of trolleys and wheelchairs exclusively for ED use will help to reduce waiting times for patients who need to be moved between different areas of the department. This dedicated focus on patient movement will improve the flow of operations and enhance the overall patient experience.

3. Establishment of a Dedicated Injection Room:

The current practice where all patients from various outpatient departments (OPDs) converge at the ED triage area creates significant congestion. A practical solution to alleviate this congestion is the establishment of a dedicated injection room within the ED. By creating a separate space for administering injections, the flow of patients through the triage area can be better managed, thereby reducing crowding and expediting the process for all patients seeking care.

4. Enhancing the Efficiency of the Admission Desk:

During periods when a concerned doctor or OPD is unavailable, the ED takes on the responsibility of managing patient admissions, which adds to the congestion in the triage area. To address this, it is necessary to enhance the effectiveness of the admission desk. This can be achieved by implementing more efficient procedures for managing admissions, ensuring that all necessary steps are carried out promptly, and providing staff training focused on optimizing the admission process. A more effective admission desk will streamline operations and help reduce the backlog of patients in the triage area.

5. Reducing Overcrowding in the Triage Area by Improving Vitals Checking:

Overcrowding in the triage area is partly due to the time-consuming process of checking patients' vital signs. To address this issue, it is important to arrange for additional equipment dedicated to the checking of vitals. Increasing the

availability of vital signs monitoring equipment and ensuring that there are enough trained personnel to operate this equipment will speed up the process. This improvement will help manage patient flow more effectively and reduce wait times in the triage area.

In summary, the proposed suggestions aim to address specific challenges identified through research in the ED at the Hospital. By increasing staffing levels, appointing dedicated staff for patient shifting, establishing an injection room, enhancing the admission desk procedures, and improving the efficiency of vital signs monitoring, these measures will collectively contribute to reducing delays, managing overcrowding, and improving the overall operational effectiveness of the ED.

DISCUSSION

The research emphasizes how difficult it is for the Emergency Department (ED) of a tertiary care hospital to manage the time allotted for different tasks. Significant differences between standard and real timeframes are found in the data; the specialty of pulmonology exhibits the largest variance, while orthopedics shows the smallest. These differences point to inefficiencies that require immediate correction. Staff shortages for patient transfers (32%) and extended wait periods for necessary diagnostic tests like MRIs and CT scans (26%) were found to be the main reasons for delays. These results highlight how important it is to have a sufficient workforce and allocate resources effectively to prevent bottlenecks and provide prompt patient care. Improvements in coordination with diagnostic services are also required; these could be made by investing in more diagnostic equipment or streamlining procedures.

The study's pilot phase facilitated the standardization of various activities, offering valuable insights that can inform the development of protocols to reduce variability and enhance operational efficiency. Addressing these issues through targeted interventions can significantly improve ED efficiency, thus enhancing patient outcomes and satisfaction. This aligns with recent findings in the literature, where ED crowding and inefficiencies have been linked to similar issues of staff shortages and diagnostic delays (17, 18, 19).

Moreover, innovative solutions like hiring additional roles (e.g., scribes, mental health nurses, social workers) and improving patient flow techniques have been shown to alleviate ED overcrowding and improve patient care (19, 20). These measures, combined with a focus on better discharge processes, can reduce ED length of stay (LOS) and improve overall efficiency (19, 21).

Overall, the study lays the groundwork for future research to explore additional factors contributing to delays, such as patient demographics and the severity of conditions. It underscores the importance of continuous quality improvement initiatives to optimize ED operations, ensuring better patient care and resource management.

CONCLUSION

The study on the procedures performed on patients registered in the ED of the Hospital helped get into the core processes taking place in the emergency room and thereby has thrown light on the various challenges faced by the staff and patients. ED being the most dynamic area in the hospital plays a vital role in the reputation of a hospital gains. Along its course of existence in society, the better the care and facilities offered by the ED of the Hospital the better the reputation of the Hospital. The study helped develop a whole new perspective on the ED and the care provided by the various departments for the patients visiting the ED. The comparison of standard time and actual time has shown the deviation of actual time from standard time, The causes of this deviation are observed and

this has helped in making suggestions that will help to optimize the care provided by the doctors, nurses, and auxiliary staff.

Acknowledgment

We extend our heartfelt thanks to all individuals and organizations whose support and contributions have been instrumental in the development of this manuscript. Their invaluable assistance and insights have significantly enriched the depth and quality of our work.

Ethical Clearance

We affirm that this study adhered to ethical standards, ensuring the integrity and compliance of our research protocol.

Conflict of Interest

The author declares no conflict of interest.

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