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Reducing Ambulance Diversion in a Tertiary Care Teaching Hospital

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ABSTRACT *An Ambulance Diversion is a phenomenon which occurs when a hospital Emergency Department (ED) cannot care for emergency patients due to reasons like ED crowding, lack of services or facilities and improper referral or less usage of primary health care system. The study focuses on causes of ambulance diversion and decrease in diversions after upgrading ED of Nizam's Institute of Medical Sciences. The results showed that effective management of ED can reduce ambulance diversion and its potential patient outcomes*

Introduction:
In periods of overcrowding, an Emergency Department can request the Emergency Medical Services (EMS) agency to divert incoming ambulances to neighboring hospitals, a phenomenon known as "ambulance diversion".[1, 2] The concept of ambulance diversion was first reported in New York City during early 1990s as a method to handle crowded emergency departments (ED) diverting ambulances carrying patients with minor injuries.[3] Ambulance diversion was reported as a global issue to manage ED crowding the following year.[4] Later on diversion has become a common practice, and in many places, the norm rather than the exception as a mitigating method to alleviate the ED crowding burden.[5] By 2003, the National Hospital Ambulatory Medical Care Survey (NHAMCS) data demonstrated that 45% of EDs initiated ambulance diversion at least once during the previous year.[6]

Ambulance diversions have an alarming effect on patient care impinging the quality of emergency care due to delay in initiating treatment. A study from New York City boroughs found the mortality rate from heart attacks increased by 47 percent on days when hospitals were on diversion.[7] Another study found that when more than 60 percent of area hospitals are on diversion, median treatment time for heart attacks increased by almost 10 minutes.[8] Diversions affect the ability of patients to get needed care from another hospital as suggested in a study in Houston. The mortality rate of patients with severe injuries requiring inter-hospital transfer was more than 11 % higher on "high-diversion" days i.e. 14 % on low diversion days and 25 % on high diversion days.[9]

Several causes can be attributed for ambulance diversions like misuse of EDs for primary care,[10, 11] unavailability of staffed hospital bed and inefficient patient flow within hospital blocking ED beds.[12] In a study by the New England Healthcare Institute, it was found that roughly one-quarter of all emergency-room visits were non-urgent, and another quarter could have been addressed or prevented by a visit to a doctor's office.[10] The uninsured are twice as likely to visit an ED for a chronic condition that could be treated by a primary care physician.[11] According to the GAO, hospitals usually diverts ambulances to other medical facilities if their emergency department staff is occupied and unable to promptly care for new arrivals.[12] The study also suggested that the inability to transfer emergency patients from the ED to other inpatient beds within the hospital contributed to diversion in 50 % of hospitals.[12]

In view of the above context, a study was conducted to understand the causes of ambulance diversions and any changes in diversions after upgrading the ED in Nizam's Institute of Medical Sciences, an esteemed tertiary care teaching hospital located in Hyderabad, India. Emergency department was upgraded to Trauma and Emergency Department in July 2012 by increasing staffed beds, emergency equipment, providing few services which were not available earlier and efficient patient flow management.

Aim of the study:
To evaluate and understand the difference in ambulance diversion after upgrading and improvement of ED services in Nizam's Institute of Medical Sciences, a tertiary care teaching hospital.

Methodology:
A retrospective study design was conducted to understand the causes of ambulance diversions in the institute. Data was collected from the registers recording maintained at Emergency Department of the institute for 5 months prior to upgrading of the department i.e. from February, 2012 to June, 2012. The register recorded the diverted cases along with the cause of diversion. The causes of diversion were identified and diverted cases were classified accordingly. This study was followed by a prospective study to understand the changes in diverted cases for 5 months i.e. August, 2012 to December, 2012. Data was collected from the same registers. Descriptive statistics were used to assess the difference in diversions. The differences were statistically tested using Student-t test with a significance level to reject the null hypothesis of p-value as less than 0.05 at 95% confidence level, using GraphPad statistical software tool.

Results and Discussion:
The ED attendance for the months of February, 2012 to June, 2012 was 6109. Out of these emergency cases,

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241cases (3.94%) were diverted to other hospitals. The causes were identified for each case in the register and were broadly classified into following 4 causes:

1. **Unavailability of services:** The institute being a Super speciality hospital does not provide few speciality services like Obstetrics and Gynaecology, Paediatrics, General Surgery, ENT, Ophthalmology, Psychiatry, etc at ED department. The cases pertaining to these specialities are usually diverted to other speciality hospitals.

2. **Unavailability of Emergency Equipment especially Ventilators:** Many emergency cases are referred to the institute which require ventilator facilities. As these equipment is cost limited, availability is limited which caused in diversion of cases which seek ventilator services.

3. **Unavailability of staffed beds:** The institute is an renowned institute in the state, attracting more number of cases which often leads to ED crowding.

4. **Not an emergency:** Few cases directly visit the ED department directly. These cases can be easily filtered at primary care centre or at a doctor's clinic and does not actually require emergency services of a tertiary care super speciality hospital.

Table – 1: Diverted cases from ED:

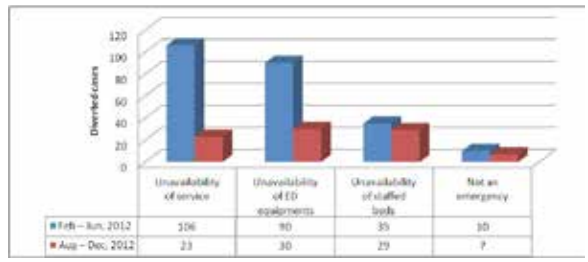
Cause of diversion	Feb – Jun, 2012	Aug – Dec, 2012	% of decrease
Unavailability of service	106	23	78.3
Unavailability of ED equipments	90	30	66.67
Unavailability of staffed beds	35	29	17.14
Not an emergency	10	7	30
Total	241	89	63.07

It was observed that out of 241diverted cases, most common cause of diversion was unavailability of services i.e. 106 cases (44%). 37% of cases (90) were diverted due to unavailability of ED equipments whereas 15% of cases (35) were diverted due to unavailability of staffed beds. Only 4% of cases were referred as they do not require emergency services. (Table – 1)

Once these causes were identified, Administration made decisions to upgrade the Emergency services by providing few speciality services like general surgical services, increasing staffed beds, increasing emergency equipments like ventilators and changed policies to increase patient flow efficiently. The institute also communicated with other hospitals and referring centres to maintain an intact referral system to avoid cases which can be treated at a lower centre or consulted as outpatient.

Data showed that there is decrease in ambulance diverts after upgrading and changing policies of ED in the institute. The ED attendance for the months of August – December, 2012 was 6805, out of which 89 cases (1.31%) were diverted to other hospitals. There was 63% decrease in total ambulance diverted cases. The difference in these diverted cases was tested for statistical significance using student-t test. The p-value obtained was 0.002 (<0.05), suggesting that there was significant decrease in the number of diverted cases. It can be noted that there considerable decrease in cases which were diverted due unavailability of services or ED equipments. (Figure – 1)

Figure – 1: Ambulance Diversion – Cause:



Causes for ambulance diversion can be broadly due to ED crowding, lack of services and facilities and patient preferences in opting out.[13] Predictors of Ambulance diversions go in hand with predictors of ED crowding like the number of available hospital beds, number of admitted patients, number of admitted patients waiting in the ED, volume of ambulance arrivals, and time to physician assessment.[14, 15] In a descriptive case study, Schneider et al. presented a ten-year experience with efforts to reduce ED crowding and ambulance diversion in Rochester, NY. ED-based efforts (ambulance diversion and short-stay or observational units) in the first ten years had little effect. Hospital-based efforts (additional cardiac telemetry monitors, float teams of registered nurses, revised AD policies, transition teams) resulted in a decrease in diversion hours and EMS turnaround time in the last two years.[16] Interventions that address ED crowding improve the underlying causes of diversion and its potential patient outcomes.

The problem of ambulance diversion can be addressed by standardizing Ambulance Diversion Criteria which include percentage of hospital beds currently in use, number of staff on duty, number of people in the ED waiting room. Hospital accountability for reporting and abiding by diversion stipulations should be tied to a hospital's receipt of federal funding, for example failure to report diversion rates in a timely manner should jeopardize hospital funding. Effective Primary health care with proper referral system is mandatory to avoid unnecessary non emergency cases visiting ED, which consume recourses of both ambulances and hospitals.[17] There should be a defined Ambulance Diversion Policy, to define the circumstances under which ambulance traffic may be diverted from an expected or "usual" receiving facility. These policies are seen in many hospitals of United States.[18]

Conclusion:

Ambulance diversion is a commonly used tool in the management of ED crowding and daily surge capacity. The study gives good evidence of reducing ambulance diversion by combating ED crowding, renewing hospital policies and maintaining strict referral system with strengthened primary care services.

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