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Original Research Article

Factors associated with overcrowded pediateric emergency rooms in Northern India and possible solutions: a medical school setting

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ABSTRACT

Background: To quantify the extent of emergency department overcrowding in a tertiary care hospital and to identify possible solutions.
Methods: A retrospective hospital record-based study was conducted at Government Medical College Jammu, Jammu and Kashmir, India from the Department of Pediaterics and comprised data of all the patients presenting to the emergency department between 1st January 2018 to 31st December 2018. Demographic characteristics, length of stay (LOS), revisit frequency and consultation status of the patients were determined.
Results: Of the 1,17,035 patients, 25,223 (43.89%) were discharged straight away while 24,113 (41.95%) were admitted to different wards and subspecialties. Besides, 6464 (11.25%) patients left the department against medical advice, 861 (1.5%) expired, 741 (1.29%) were referred to other hospitals and 67 (0.12%) were dead on arrival. Of those who were admitted, 1,4498 (60.13%) patients stayed for more than 10 hours before getting the main hospital bed. Mostly, the delays observed were due to delay in getting lab reports, already preoccupied ventilators and incubators in pediatric and neonatal intensive care units, not using checklist for proper reassessment of patients and early discharge, overburdened by patients coming in just for nebulization and intravenous or intramuscular medications, the admitting residents detain the unstable patient longer in emergency department before admission to wards.
Conclusions: In conclusion, cooperation of the managers, relevant departments and a multidisciplinary approach are necessary to achieve the goals to reduce overcrowding in the emergency departments.

Keywords: Emergency department, Quality of care, Overcrowding, Patient safety

INTRODUCTION

Emergency department (ED) crowding was first described nearly 20 years ago.[1,2] The ED has been labeled the "canary in the coalmine" of the healthcare system and the struggles of the ED continue to dominate headlines.[3-5] Overcrowding of the ED is a significant public health problem in the United States of America (US), Europe, and Asia.[6-9] The international crisis of ED crowding has received considerable attention, both in political and lay venues.[10-16] According to the American college of emergency physicians, 'Crowding occurs when the identified need for emergency services exceeds available resources for patient care in the ED, hospital or both.[17]

In recent years, because of the increase in population and internal migrations, excessive amounts of patients are observed in the emergency departments of training and research hospitals.[18] It also reduces the quality of care the patient receives, the length of stay (LOS) for non-elective

admissions rises and the number of serious incidents rise.[19] There are a number of scales available in literature though none are adequately validated.[20,21]

The phenomenon of ED overcrowding cannot be attributed to any single factor but instead appears to be a product of complex causal relations, encompassing several internal and external factors most of which are beyond the control of ED staff.[22-24]

Possible causes include use of the ED for non-emergent cases an aging population, increasing patient acuity, labour, shortages, lack of community based alternatives to the ED, delays while waiting for laboratory testing to be completed, lack of public education regarding appropriate ED use and the range of services available in general practitioners offices, lack of long-term care and other alternative settings, and lack of availability of ED or inpatient beds (or both).[22-28] Patients who present to EDs often face long waiting times to be treated and those who require admission have even a longer wait for an inpatient hospital bed. The current study was planned to analyse some of the specific causes of overcrowding and possible solutions. By analysing the duration and causes of prolonged stay, we attempted to better delineate the problem and propose possible solutions. The data may be helpful in persuading hospital administrators to adopt necessary changes to improve the quality of ED patient care.

The current study was planned to analyse some of the specific causes of overcrowding and possible solutions. By analysing the duration and causes of prolonged stay Author attempted to better delineate the problem and propose possible solutions. The data may be helpful in persuading hospital administrators to adopt necessary changes to improve the quality of ED patient care.

METHODS

Author retrospectively collected the medical data of the patients admitted in Government Medical College Jammu, Jammu and Kashmir, India from the department of Pediatrics in a one-year period between 1st January 2018 to 31st December 2018. Data was collected through the hospital record section (HRS) that generates daily reports.

Inclusion criteria

Only those patients whose stay at the ED was prolonged i.e. they stayed there for 4 or more hours were included.

Demographic data, including age and gender, were recorded, annual ED admission count, seasonal distribution, number of repeated visits within 24 hours LOS of the patients in the ED observation rooms, and period of arrival of consultants were investigated.

Explicit criteria for clinical data were defined before chart review and included patient's disposition and the reasons for delay.

The former included (a) Admission to hospital, (b) discharged home, (c) transferred to other facility, (d) left against medical advice, (e) expired in ED and dead on arrival.

Statistical analysis

Medical data was recorded on Statistical Package for the Social Sciences (SPSS) 15.0 programme.

The reasons for delay observed included

- Unavailability of beds, incubator and ventilator for patients planned to be admitted to the hospital
- Unnecessary hold of critically ill patients in ED by the admitting residents for further stabilization
- Delays in service provided by laboratory, ancillary services, and shortage of staff
- Flow of patients coming for only intravenous (IV) or intramuscular (IM) medications and for nebulisation from home or being referred from other periphery situated hospitals
- No proper provision available for reassessment of patients in ED, especially during step-down process to other non-critical areas or to decide for early discharge or disposal from ED.

RESULTS

Of the 1,17,035 patients, 57,469 (49.10%) stayed in the ED for more than 4 hours. Of them, 25,223 (43.89%) were discharged straight away from the ED, while 24,113 (41.95%) were admitted into different wards and subspecialties of the hospital.

In addition, 6464 (11.25%) left against medical advice (LAMA), 861 (1.5%) expired, 741 (1.29%) were transferred to other hospitals (referred), 67 (0.12%) were already dead on arrival (DOA) (Table1).

Table 1: Distribution of ED patients with stay longer than 4 hours.

Breakup of patients in the ED with stay longer than 4 hours		
Total patients	**Number**	**%**
Discharged	25223	43.89
Admitted	24113	41.95
LAMA	6464	11.25
Expired	861	1.5
Referred	741	1.29
DOA	67	0.12

Maximum number of patients were admitted in May (2369), June (2323) and September (2133) whereas least

number of patients were admitted in April (1553). The reason of this human density may be associated with summer vacation, increasing number of outdoor activities and tourist travel. (Table 2).

Table 2: Distribution of patients according to months.

Month	NICU	Infant	Pediatric	Total
January	448	675	968	2091
February	646	614	868	2128
March	468	574	859	1901
April	364	456	733	1553
May	531	624	1214	2369
June	554	559	1210	2323
July	501	374	1073	1948
August	585	416	1097	2098
September	587	495	1051	2133
October	558	479	958	1995
November	538	407	791	1736
December	524	465	849	1838
Total	6304	6138	11671	24113

Of those patients who were admitted to wards or different sub-specialties and stayed in the ED for more than 4 hours, 6304 (26.14%) were triaged as level-1 or critically ill patients who needed PICU/NICU care (Table 3).

Table 3: Percentage of level-1 or critically ill patients who need PICU/NICU and stay of > 4 hours.

Patients	Number	%
Level 1 patients	6304	26.14
Other than level 1	17809	73.86

Moreover, in 14,998 (60.13%) patients for whom admission had been decided in the main hospital beds upstairs, the length of stay was more than 10 hours in ED before getting that admission (Table 4).

Table 4: Length of stay of admitted patients in ED to the main hospital bed.

Patients	Number	%
>10 hours	14498	60.13
<10 hours	9615	39.87

Of those who were discharged with stay of more than 4 hours in the ED, the most common age groups were: 15,260 (26.55%) neonates (aged less than 28 days), 14,479 (25.19%) infants (28 days -12 months), and 11671 (48.40 %) were aged above 1 years.

Thus, 29,739 (51.74%) patients were aged below 1 years (Table 5).Similarly, of those who stayed for more than 4 hours in ED before getting hospital bed, the most common age groups were: 6304 (26.14%) neonates (aged less than 28 days), 6138 (25.46%) infants (28 days-12 months), and 11671 (48.40 %) were aged above 1 years. (Table 6).

Table 5: Age distribution of patients discharged in more than 4 hours.

Patients	Number	%
Neonates	15260	26.56
Infants	14479	25.19
Pediatric	27730	48.25

Table 6: Age distribution of patients admitted in more than 4 hours.

Patients	Number	%
Neonates	6304	26.14
Infants	6138	25.46
Pediatric	11671	48.40

Of all, 37,265 (31.84%) patients were documented as level-5 according to the emergency severity index (ESI) or having least urgent complaints coming in ED after the main consulting clinic of the hospital get closed, at noon (Table 7).

Table 7: Percentage of patients with level-5 or with least urgent complaints.

Patients	Number	%
Level 5/ Fast track	37,265	31.84
Patient on ED Beds	79770	68.16

Moreover, 8,237 (7.04%) patients came in just for nebulisation, IV or IM medications either from home or referred by the main consulting clinic.

DISCUSSION

ED overcrowding is closely related to a decrease in subjective patient satisfactions and objective quality care.[29-32] In a great deal of studies, the outrageous crowd in the emergency departments is reported to become more common and reached a critical point, thus the situation created a threat for public health and patient safety.[33-35] In present study, 57,469 patients stayed in the ED for more than 4 hours before being discharged or admitted into hospital. Most of them waited for reports of their blood tests sent to the main laboratory of the hospital, while waiting for final assessment by ED physician to admit or to discharge. Some time lapse occurred due to delay in intervention or treatment required either due to shortage of nursing staff or due to already overburdened nursing staff and doctors. Usually, the lab took 4 to 6 hours to generate the reports almost for all patients who had a stay of more than 4 hours in ED. A significant proportion of patients presented in emergency department with health problems which are classified as non-urgent. This single factor has been suggested as an important contributor to overcrowding not only in Government Medical College

Jammu, Jammu and Kashmir, India but also in many other hospitals worldwide.

The French government implemented several measures to improve the coordination of health care services and EDs and to control the flow of ED visits.[36] Alternative health care structures, such as primary care units located near the hospitals that can take care of non-urgent patients who go by themselves to an ED or have been wrongly directed to one, were constructed. These structures helped solve the ED overcrowding problem.[37] Inappropriate use results in not only compromised efficiency of healthcare personnel, infrastructure, and financial resources of the ED, but also in delay of treatment of serious medical conditions.[38,39] Admitted patients had a longer LOS because of delays in obtaining inpatient beds.[40] Another factor that affects LOS in the ED is inpatient LOS.

The most common complaints of patients presenting in the ED was diarrhea and vomiting, so physicians were facing delay in receiving serum electrolytes report for early decision of either to discharge or to admit the patients after intravenous rehydration. Similarly, neonates were waiting for serum bilirubin report to decide either for phototherapy treatment or to send them back home. Similarly, the patients with fever and fit were waiting for hematology and metabolic profiles result. The issue is to be discussed with our organizational reforms and the decision to get point-of-care testing (POCT) has to be implemented for quick reporting and early decisions for patients staying in ED for longer period of time. It will definitely decrease the length of stay that will impact the quality of care as well. The main causes of crowding in literature includes non-urgent visits, frequent flyer patients, influenza season, inadequate staffing, inpatient boarding and hospital bed shortage. The major effects of crowding are patient mortality, transport delays, treatment delays, ambulance diversion, patient elopement and financial effect. The major solutions of crowding include additional personnel, observation units, hospital bed access, non-urgent referrals, ambulance diversions, destination control, crowding measures and queuing theory.[41] A large number of high-quality articles have been published about ED crowding.[42,43] However literature reviews show that randomized controlled trials are lacking, perhaps because many ED operational changes involve the entire department, rather than the individual patient who may be randomized to experimental and control groups.[44] Expanding inpatient hospital bed capabilities, especially intensive care unit (ICU), is a long-term solution. Most of the patients in the study who needed admissions to the wards were less than 5 years old. The option can be to increase the number of beds with sizes for children aged less than 5 years, so that it can create some additional space in different wards by replacing large-size beds. The beds may be made available if the in-patients are discharged early in the day.

In the current study, 26.14% patients needed care in PICU and NICU. Some of them needed ventilator support as well, but there were limited numbers of ventilators in the hospital and they were mostly preoccupied. One of the options was to move the critically ill patients outside hospital as they needed immediate care in PICU/NICU setting after confirmation of unavailability of space inside the hospital. Under ideal conditions, all ED-attending patients needing inpatient care should be admitted into the wards within 4 hours. This was not possible, however, without available beds. If the holding of admission needing patients in the ED has become a common practice, it would be better to develop a holding unit or an acute care unit (ACU) for a subset of patients who would otherwise wait in the ED for a prolonged period while being treated for their conditions.[45,46] authors can thus elevate the quality of care and comfort of the patients. The critical care beds would be then available for new needy patients and their waiting time may also be reduced. Many EDs in the United States have developed observation units to further clarify which patient really needs hospital admission. With these observation units, many patients avoid hospital admission even after initial treatment in the ED that would have led to hospitalization. So, the possible solutions discussed above with a proper step-down or observation unit will be very helpful for a better impact on quality of care provided.

Limitations of the study includes a retrospective design based on existing patient registers or databases cannot exclude the possibility of confounding that may have affected these results. Accuracy and variability in the quality of documentation among different health care personnel it was not feasible to ensure with retrospective audit of databases. The findings show considerable variability in crowding measures, time intervals, patient populations and hospital status, resulting to inability to generalize. Another major limitation of this study is that physician patient contact time during an ED visit was not recorded due to retrospective data collection. One factor that may affect the ED stay is sickness rate of staff, physicians, or consultants. These data were also not available.

CONCLUSION

ED overcrowding could be considered as a ‘‘local’’ manifestation of a ‘‘systemic’’ disease. The causes of it are a complex network of interwoven processes and the effects of ED crowding are numerous and adverse. Various targeted solutions have been attempted, but further studies of efficacy are needed. ED boarding is one of the main factors for overcrowding, but emergency physicians and hospitals as a whole must take actions to mitigate the problem because the ED alone cannot solve the problem. Always keeping in mind that targets cannot overrule clinical judgment, 90% of all patients should leave the ED within 6-8 hours, improving the use of existing beds as first line hospital strategy and only later considering the use of admitted patients to hallway beds when the ED is close to full capacity. Policy makers and

hospital managers must focus on measures to reduce non-urgent presentations to the ED in order to minimize possible medical inaccuracies. Moreover, authors have to strengthen not only our outpatient department in tertiary care hospitals but also make improvements at primary and secondary health care level, so that patients with non-urgent problems can be dealt in primary and secondary health care centers.

Recommendations

Shortage of ED staff should be fulfilled on an immediate basis for in-time proper intervention and management of patients required inside ED and that is one of the important risk factors compromising the quality of care in our set-up. One reason for delay in transfer of patients from ED to the hospital bed was the shortage of nurse aids. There should be a day care unit outside ED for patients who are coming in just for nebulization, and IV or IM medications. It will ease the burden on ED staff and physicians who are already overburdened. Although their percentage, i.e. 7.04%, was small with length of stay of less than 4 hours, it was one of the factors involved in delay of treatment to patients being admitted in non-critical areas of ED due to interruption faced by the nursing staff. There should be a checklist for reassessment of patients in ED, especially in a proper step-down area for quick recovery and stabilization of ill patients that will result in a shorter duration of stay in ED. There should be a separate consulting area in afternoon and evenings for patients of level-5, coming in with least urgent complaints. Emergency physicians and administrators from different hospitals should join to develop a realistic and effective protocol to facilitate inter-facility transfer and prevent patient dumping. ED overcrowding is multidisciplinary problem that can only be solved by joint efforts of various departments and the administration of the hospital.

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