BRIEF RESEARCH COMMUNICATION

Delayed Transfer of Critically Ill Patients from Emergency Department to Intensive Care Unit

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Abstract

Background and aim: Delay in the transfer of critically ill patients from the emergency department (ED) to intensive care units (ICUs) may worsen clinical outcomes. This prospective, observational study was done to find the incidence of delayed transfer.

Materials and methods: After approval from the institute ethics committee and written informed consent, all patients admitted to ICU from ED over 6 months were divided into groups I and II as patients getting transferred to ICU within 30 minutes of the decision or not, respectively. The factors affecting the immediate transfer and clinical outcome of all patients were noted. Monthly feedback was given to the ED team.

Results: Out of 52 ICU admissions from ED, 35 (67.3%) patients were not transferred within 30 minutes, and the most frequent factor preventing immediate transfer was ED-related (54%). A statistically significant difference was found in acute physiology and chronic health evaluation (APACHE II) score, clinical deterioration during transfer, longer duration of mechanical ventilation and length of stay, and higher mortality with patients transferred immediately to ICU. A reduction of 42.6% was noted in transfer time from the first month to the last month of study.

Conclusion: The incidence of delayed transfer of patients from ED to ICU was 67.3% with ED-related factors being the most frequent cause of delay (54.2%).

Keywords: Critically ill adults, Emergency service, Intensive care unit, Patient admission.

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Highlights

Delayed transfer of critically ill patients from the emergency department to the intensive care unit (ICU) may lead to worsened outcomes. While 67.3% of patients could not be immediately transferred to ICU, it did not affect clinical outcomes. A reduction in transfer time by 42.6% with monthly feedback to the emergency department (ED) team is a promising intervention.

Introduction

A critically ill patient requires immediate attention in terms of aggressive resuscitation in the ED and thereafter, definite care in an ICU. Due to the paucity of available beds in ICUs, the increasing number of admissions in ED, and factors preventing immediate transfer to ICU, a mismatch occurs due to which patients suffer from delayed transfer to ICUs. This delay in transfer to ICU leads to higher mortality and longer duration of hospital stay in critically ill patients.[1,2]

The factors causing a delay in transfer to ICU from ED can be patient-related factors, administrative delays, issues at the level of ED, or problems at the level of ICU.[1,3,4] Also, there is no consensus on the definition of what constitutes a delay as different authors have considered different time points as the cutoff of delays depending upon the facilities and manpower in ED and the methodology used. We conducted this observational study with the primary objective of finding the incidence of delayed transfer. The secondary objectives were to analyze the factors affecting the immediate transfer of patients from ED to ICU, the clinical outcome of patients not getting transferred immediately, and any change in transfer time from the first month of data collection to the last month of data collection.

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Materials and Methods

After approval from the institute ethics committee (NK/5625/MD/941) and written informed consent from the patient's guardian, a prospective observational study was carried out in all patients admitted to ICU from ED over a period of 6 months. The demographic parameters of patients, the time at which the ICU transfer decision was taken, the time at which ED was informed, and the duration between this information and to actual time at which the patient received in ICU were recorded. Immediate transfer to ICU was considered if the patient was transferred to ICU within 30 minutes of informing the ED team.

The patients were divided into group I, patients who got transferred immediately, and group II, patients in whom transfer got delayed by more than 30 minutes. The immediate clinical deterioration of the patient was defined as a decrease in Glasgow coma scale (GCS), 20% variation in hemodynamic parameters, drop in oxygen saturation, increase in the dose of inotrope or addition of another inotrope, need for securing the airway from the time of ICU admission decision. Any dislodgement of the endotracheal/tracheostomy tube on arrival to ICU and/or discontinuation of any ongoing infusion was also considered as clinical deterioration. The duration of mechanical ventilation, length of stay in ICU, and mortality were recorded for all patients.

The factors preventing immediate transfer were categorized as patient-related factors (consent, expense, requirement of investigation/intervention), administrative factors (medicolegal certification, eligibility for free treatment), ICU-related factors (cleaning, disinfection of bed/ventilator), and factors related to ED (non-availability of manpower/trolley/equipment, etc.). At the end of every month, data was communicated to the ED team consisting of consultants and senior residents posted for the next month.

For statistical analysis, Statistical Package for the Social Sciences (SPSS), version 23 (IBM Corporation, Armonk, New York, USA) was used. For a measure of central tendency, mean and median were calculated for all quantitative variables. Standard deviation and interquartile range were calculated for measures of dispersion. Descriptive statistical analysis was done for factors affecting the immediate transfer of patients from ED to ICU. The Chi-square test or Mann–Whitney test was used to compare demographic and outcome parameters between patients of groups I and II.

Results

Out of 216 ICU admissions during the study period, 52 were admitted from ED with 23 (44.2%) male and 29 (55.7%) female patients. The median age was 30 years, interquartile range (IQR) (22–52.7). The average time taken to inform ED about the ICU admission decision was 2.1 ± 1.6 minutes. After this, the average time taken for ED to ICU transfer was 69.9 ± 62.5 minutes. Out of 52 recruited patients, 35 patients were not transferred immediately to ICU (group D) and the factors preventing immediate transfer were related to ED related (19, 54%), patient-related (10, 28%), administrative (4, 11%) and miscellaneous (2, 6%). The characteristics of patients in two groups, groups I and II, are depicted in Table 1.

The mean transfer time in the first month was 162.1 (109.2) minutes (median, 150; IQR, 82.5–210) whereas the mean transfer time in the last month of the study was 69.0 (37.0) minutes (median, 85; IQR, 36.2–90) thereby, reducing the transfer time by 42.6%.

Table 1: Demographic and outcome parameters of groups I and II

Parameter	*Group I (n = 35)*	*Group II (n = 17)*	
Age (years)	27 (21–46.5)	31 (24–61)	0.245
Gender (M/F)	16/19	7/10	0.497
APACHE II score	14 (9–17)	20 (13–23)	0.013
Decision information time (minutes)	2 (1–3)	1 (1–2)	0.242
Transfer time (minutes)	75 (60–90)	20 (20–30)	
Resident accompanying (*n*)	16 (45.7%)	10 (58.8%)	0.278
Hand over to ICU team (*n*)	16 (45.7%)	10 (58.8%)	0.278
Clinical deterioration on receiving in ICU	2 (5.7%)	3 (17.6%)	0.315
Duration of mechanical ventilation (days)	5 (3.5–8.5)	10 (5–16)	0.043
Length of ICU stay	8 (5–10.5)	14 (7–17)	0.029
Mortality	5 (14.3%)	5 (29.4%)	0.177

*Data presented as number/median/percentage, as applicable

Discussion

In this prospective, observational study, the incidence of patients who could not be immediately transferred from ED to ICU was 67.3% and the most frequent cause of delayed transfer was issues related to ED (54.2%).

The incidence of delayed transfer to the ICU varies widely depending on the time interval taken as a cutoff to define the delay. Similar to our definition of delay as any patient not getting transferred to ICU immediately, Cardoso et al. reported an incidence of 68.8% delayed admissions (2.3–67.2 hours).[2] When considering a transfer time of longer than 4 hours as a delay, Young et al. reported 61.5% incidence,[5] while a delay of 46%[6] and 37%[7] has been reported by defining a transfer time of longer than 6 hours as a delay. However, using the same definition of 6 hours, Chalfin et al. reported minimal delay (2.1%).[1] The incidence of delayed transfers reduced to 23.4% when the authors considered more than 24 hours of ED stay as a delay.[8] Singer et al. showed that the incidence of delayed transfers depends on the time interval considered as delay, less than 2 hours (49.7%), 2–6 hours (36.7%), 6–12 hours (7.5%), 12–24 hours (5%), and more than 24 hours (0.9%).[4]

Non-availability of ICU beds and limited hospital capacity has been frequently reported as a cause of admission delays.[1,2,4] However, we identified that the factors related to ED prevented immediate transfer despite ICU bed availability. The delay in clinical decisions is an important factor in older patients, as they may not develop significant vital sign abnormality.[6]

The boarding time in ED did not result in clinical deterioration or affect the outcome of patients as also reported by Tilluckdharry et al. and Saukkonen et al.[8,9] Once the patients were stabilized in terms of airway, breathing, and circulation, delayed transfer had no effect on mortality.[10] In contrast to these observations, longer hospital stay and higher mortality (ranging from 4.5% to 43.4%) in patients experiencing delayed ICU transfer has been reported by various authors.[1,2,4,5,8,11]

Interestingly, we noted a higher APACHE II score, clinical deterioration during transfer, longer duration of mechanical ventilation and length of stay, and higher mortality in patients transferred immediately to the ICU. This is similar to the finding of Duke et al. who reported that sicker patients were transferred to ICUs on priority for effective resuscitation and definite care.[12]

The monthly feedback to the ED team served as a quality improvement initiative by reducing the transfer time to ICU by 42.6% (mean transfer time 69 minutes). An increasing number of ICU beds and a higher nurse–patient ratio have been suggested to improve transfer times[2] but this involves high cost. Cohen et al. reported that training of two microsystems, the ED team and the ICU team, and an efficient team approach reduced transfer time by 48%.[13]

To address delayed transfer to ICU from wards, forming parallel screening teams ensuring availability of ICU facility,[14]

implementations of critical care outreach teams to detect deteriorating ward patients[6] and a multidisciplinary team approach to analyze data and manage interventions according to feedback[15] have been proposed.

Since we included all patients getting admitted from various emergency wards of our tertiary care busy hospital, there was no selection bias. Also, our study explores factors preventing immediate ICU transfer despite ICU transfer decisions and bed availability in ICU. The baseline data of a hospital process helps plan quality improvement programs. However, this is a single-center study and the results of our study may not be applicable to other institutes.

To conclude, the incidence of patients who could not be immediately transferred from ED to ICU was 67.3% and the factors related to ED were the most frequent cause of delay (54.2%). However, the delay in immediate transfer did not affect the clinical outcome of patients and the monthly feedback to the ED team reduced the transfer time by 42.6%.

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