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## PRESCRIPTION ANALYSIS IN THE PATIENTS ADMITTED TO THE EMERGENCY MEDICINE DEPARTMENT AT TERTIARY CARE TEACHING HOSPITAL

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**ABSTRACT: Introduction:** The Emergency Medicine Department presents distinct challenges, both diagnostic uncertainty and time constraints. Promptly administering the right drugs in this setting can be crucial for saving lives. Hence, we conducted a study to analyse the prescriptions in the patients admitted to Emergency Medicine Department. **Method:** This is a prospective, observational single center study conducted at the Emergency Medicine department for one year. The study was started after approval from Institutional Review Board (IRB). All patients of any gender and any co-morbidities admitted to emergency medicine department were included in the study. **Results:** In this study, total 305 patients included, out of which majority 79 (25.9%) patients were in the age young group 31-40 years. Gender distribution depicts 262 (85.9%) and 43 (14.09%) were males and females respectively. Two wheeler accidents 119 (39.01%) were the most common. Total 186 (64.13%) patients having GCS score 11-15. Pantoprazole was the most commonly prescribed drug, prescribed in 200 (81.96%) prescriptions. Ondansetron was in used in 90 (28.19%) patients. Cefixime is used in 70 (22.95%), ofloxacin in 30 (9.83%). The fixed drug combination, Glipizide + Metformin was used in 36 (11.80%) patients. **Conclusion:** Our study provides various insights into the analysis of prescribing drugs in the uniquely challenging environment of the Emergency department. The prescribed medications in the study were as per the patient's condition. We propose that future studies should be conducted to explore the rational management of patients.

**INTRODUCTION:** Prescribing medications poses constant difficulties for healthcare providers, particularly in emergency situations. The Emergency Department presents distinct challenges, as clinicians often encounter both diagnostic uncertainty and time constraints. Promptly administering the right drugs in this setting can be crucial for saving lives <sup>1</sup>.

Emergency medicine is the field of expertise that attends to individuals during their most precarious life moments <sup>2, 3</sup>. In the emergency care department, there is always a possibility of drug prescription errors due to the critical condition of the patient and the need for rapid decision-making by physicians.

Nevertheless, timely drug administration is crucial for positive outcomes, and using unnecessary or unsuitable drugs can result in patient and community harm, including adverse events and treatment failure <sup>4</sup>. According to a recent study, about 20% of hospitalized patients who received different medications encountered clinically significant adverse drug events <sup>5</sup>.

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In acute and unpredictable situations, clinicians encounter diverse patients with unforeseen conditions. To ensure rational drug prescription, it is essential to use the minimum number of drugs, in the correct dosage and form, for the appropriate indications. This approach aims to achieve the most effective therapeutic effect in a short period of time<sup>6</sup>. The study on drug prescribing, offers valuable information about drug usage patterns and the rationality of prescriptions. The findings will aid in understanding drug utilization trends and formulating evidence-based guidelines for policy decisions across different healthcare levels. This holds particular significance in impoverished and developing nations, where it is crucial to make the best use of limited resources<sup>7</sup>. After conducting a literature search, we discovered a limited number of studies on drug prescribing in emergency care departments. As a result, we decided to initiate our own prescription analysis study in the emergency care department<sup>8,9</sup>. Understanding the factors that contribute to drug prescription errors in emergency care departments is crucial for improving patient safety and quality of care. By contributing valuable data to the field, we hope to facilitate more targeted and efficient healthcare practices in addressing trauma cases and ultimately improve the overall management of emergency care in India<sup>10</sup>.

## MATERIALS AND METHODOLOGY:

**Study Type:** The type of study was a prospective, observational single center study.

**Study Site:** The study was conducted at the Emergency Medicine department, Tertiary care teaching hospital.

**Study Duration:** The study was conducted for a total duration of 12 months from August 2021 to November 2022.

**Study Method:** The data was collected in patient admitted to emergency medicine department, the prescribed drugs along with other details were recorded. The follow up data was also recorded in Case Record Form (CRF).

### Inclusion Criteria:

- All patients of any gender admitted to emergency medicine department.

- Patients with any co-morbidities were also included.
- Patients who have given a written informed consent in the study.

### Exclusion Criteria:

- Patients who did not consent for enrolment or regular follow up were excluded from the study.

**Ethical Approval:** The study was started after approval from Institutional Review Board (NHLIRB2021/17) and superintendent of the hospital. Written and informed consent was taken from the patients who were enrolled in this study.

In case record form, the data was collected like patient name initials, age, gender, address, type of trauma/injury, vehicular injury and triage priority,

Triage priority level<sup>11</sup> was defined as follows:

**Triage Priority 1:** Patient with airway, breathing or circulation compromise, or head injury with GCS < 8

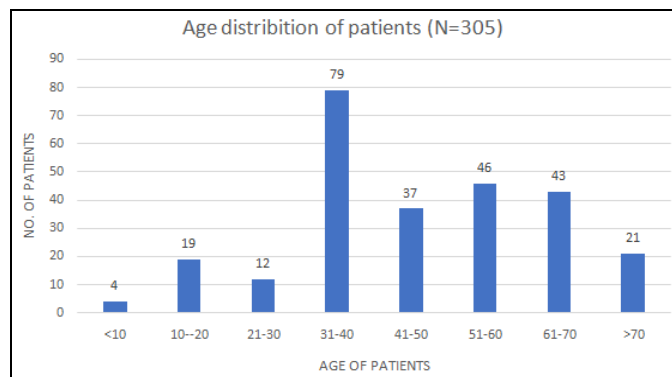
**Triage Priority 2:** Patient with stable airway, breathing and circulation with long bone injuries, dislocations, stable abdominal thoracic injuries, head injury with GCS 9, or more

**Triage Priority 3:** Hemodynamically stable patients with minor trauma

Site of injury in patients GCS scale of patient was recorded at the time of admission. Prescribed drug details, their route, dose, frequency and duration including drugs used as Fixed Dose Combination (FDC) were analysed. The direct cost of therapy was also calculated. The data was entered in sheet and statistical analysis was done using Microsoft Excel and the software SPSS Version 26. The percentage and mean were calculated whenever applicable.

**RESULTS:** In this study, total 305 patients included, out of which majority 79 (25.9%) patients were in the age young group 31-40 years followed by 46 (15.73%), 43 (15.08%), 37 (14.09%) in the age group 51-60, 61-70 and 41-50 years of age.

Total 4 patients (6.22%) were <10 years of age. Total 21 (0.98%) were of >70 years of age **Fig. 1**.



**FIG. 1: AGE DISTRIBUTION OF PATIENTS (N=305)**

In this study, out of 305 patients, most of the patients were males, 262 (85.9%) and 43 (14.09%) were females **Table 1**.

**TABLE 1: GENDER DISTRIBUTION AMONG PATIENTS (N=305)**

	Number of patients	Percentage (%)
Male	262	85.90
Female	43	14.09

As shown in **Fig. 2**, the triage priority distribution was as follows: Priority one (15.5%), priority two (56%), and priority three (28.5%). Most of the trauma incidents 222 (72.78%) were the result of an RTA. Two-wheeler accidents 119 (39.01%) were the most common followed by four-wheeler 35 (11.47%), fall from height 26 (8.19%) pedestrian injuries 17 (5.57%), autorickshaw accidents 5 (1.63%). And other vehicular accidents 26 (8.52%) which included trains, tractors, and

**TABLE 2: VEHICULAR INJURY AND TRIAGE PRIORITY LEVEL**

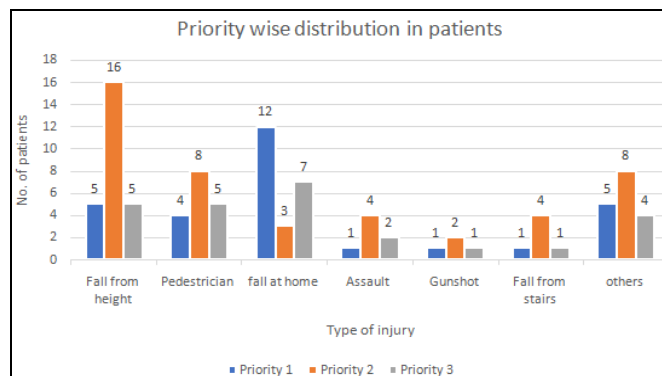
	Total (%)	Priority 1	Priority 2	Priority 3
Two-wheeler	119 (39.01%)	12	67	20
Four-wheeler	35 (11.47%)	5	22	8
Autorickshaw	15 (4.91%)	2	10	3
Another vehicle	26 (8.52%)	6	16	4

Two-thirds of the patients (67%) were referred cases from other hospitals. Nine patients were intubated elsewhere and referred while a further 78 patients (4.8%) required intubation in our ED. The head injury is commonest in 231 (75.73%) patients.

**TABLE 3: SITE OF INJURY IN PATIENTS (N=305)**

Site of injury	Number of patients (N= 305)	Percentage (%)
Abdominal injury	60	19.83
Brain injury	44	14.42
Orthopaedic	159	52.13
CNS (with spinal cord injury)	111	36.39

large trucks. Ten percent of these RTA victims were allegedly under the influence of alcohol. Other modes of injury included fall on level ground 5 (1.69%), assault 7 (2.29%), electrical injuries 2 (0.65%), and animal-related injuries 1 (0.32%).



**FIG. 2: PRIORITY WISE DISTRIBUTION IN PATIENTS (N=305)**

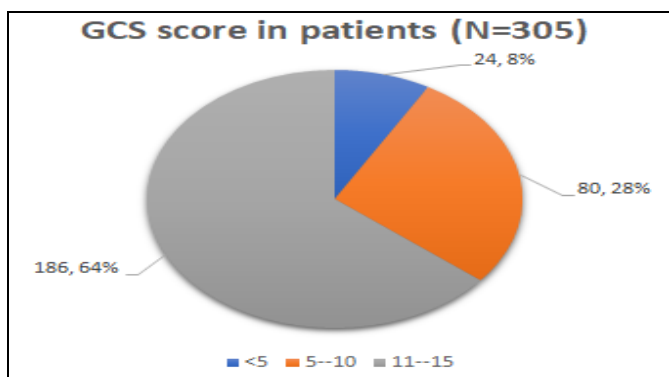
The triage priority-wise distribution of these accidents is shown in **Fig. 2**. The vehicular injury is commonest mode of injury in this study. It is evaluated as priority level in **Table 2**.

Vehicular accidents are common, among which two-wheeler accidents are commonest (n=119, 39.01%) and 12, 67 and 20 patients with priority level 1, 2 and 3 respectively. total 35 (11.47%) patients having four-wheeler accidents with 5, 22 and 8 patients with priority level 1, 2 and 3 respectively. Total 15 (4.91%) patients having auto rickshaw accidents with 2, 10 and 3 patients with priority level 1, 2 and 3 respectively.

Others are CNS injuries 111 (36.39%), soft tissue injury is seen in 102 (33.34%), ENT injuries in 96 (31.47%) and orbital injury in 42 (13.77%) patients **Table 3**.

ENT	96	31.47
Head injury	231	75.73
Lung injury	9	2.95
Maxillofacial injury	51	16.72
Orbital injury	42	13.77
Pelvis injury	12	3.93
Vertebrae	6	1.96
Thorax	21	6.88
Soft tissue injury	102	33.44

In this study, the Glasgow Coma Scale (GCS) was also recorded at the time of admission **Fig. 3**. Total 186 (64.13%) patients having GCS score 11-15 followed by 80 patients having GCS score 5-10 and 24 patients having GCS score <5.



**FIG. 3: GCS SCORE OF PATIENTS (N=305)**

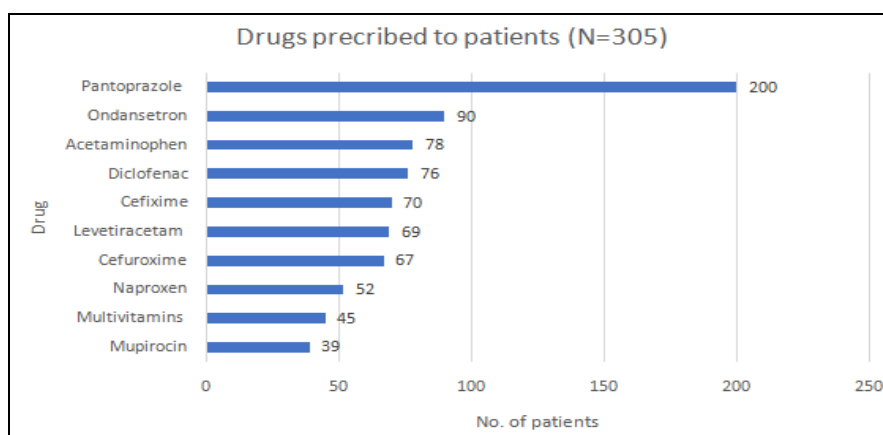
As shown in **Table 4**, most of the drugs prescribed in the patients are of oral and i.v. route. The average number of drugs prescribed are  $6.22 \pm 2.13$ . total 850 (44.76%) drugs are prescribed by i.v. route and 793 (41.78%) drugs are administered *via* oral route. Some drugs are used inhalational route 104 (5.47%), topically 83 (4.37%) drugs. Total 35

and 33 drugs are given subcutaneously and intramuscularly respectively.

**TABLE 4: ROUTE OF DRUGS PRESCRIBED (N=305)**

Route	No. of drugs	Percentage (%)
Intravenous	850	44.76
Oral	793	41.78
Intramuscular	33	1.73
Subcutaneous	35	1.84
Topical	83	4.37
Inhalation	104	5.47
Total	1898	

**Fig. 4** shows that pantoprazole was the maximally prescribed drug, prescribed in 200 (81.96%) prescriptions. Anti-emetic drug like ondansetron was in used in 90 (28.19%) patients. Antibiotics like cefixime in 70 (22.95%), cefuroxime in 67 (21.96%), ofloxacin in 30 (9.83%), Amikacin in 22 (7.21%) patients. Vancomycin is used in 15 (4.91%) patients. metronidazole is used in 35 (11.47%) patients. Antihypertensives were also prescribed in the patients amlodipine was used in 53 (17.37%) and hydrochlorothiazide in 40 (13%). NSAIDs like acetaminophen is used in 78 (25.57%) and diclofenac is used on 76 (24.91%) patients.



**FIG. 4: DRUGS PRESCRIBED TO THE PATIENTS (N=305)**

Various Fixed dose Combinations (FDCs) used are shown in **Table 5**. The commonest FDCs were Glipizide + Metformin in 36 (11.80%) followed by Vitamin B complex in 34 (11.14%), Aspirin +

Clopidogrel in 29 (12.78%), Enalapril + Hydrochlorothiazide in 27 (8.85%), Calcium + Vitamin D in 27 (8.85%) *etc.*

**TABLE 5: FIXED DOSE COMBINATION (FDC) USED IN PATIENTS (N=305)**

FDC	No. of patients	Percentage (%)
Amoxicillin + Clavulanic acid	20	6.55
Aspirin + Clopidogrel	29	12.78
Calcium + Vitamin D	27	8.85
Cefoperazone + Sulbactam	3	0.98
Piperacillin + Tazobactam	6	1.96
Rabeprazole + Domperidone	30	13
Iron + Folic acid	9	2.95
Vitamin B complex	34	11.14
Glipizide + Metformin	36	11.80
Enalapril + Hydrochlorothiazide	27	8.85
Acetaminophen + Tramadol	6	1.96

**Table 6** shows cost burden among patients during the duration of admission in emergency department. Total cost of drugs prescribed was <1000 Rs in 161 (52.78%) patients while 114 (37.37%) patients had cost burden of drugs 1000-2000 Rs. And 30 (9.83%) patients had cost burden >2000 Rs.

**TABLE 6: COST OF DRUGS AMONG PATIENTS ADMITTED IN EMERGENCY DEPARTMENT**

Cost (Rs)	No. of patients (N=305)	Percentage (%)
<250	9	2.95
250-500	46	15.08
501-750	46	15.08
751-1000	60	19.67
1001-1250	77	25.25
1251-1500	16	5.25
1501-1750	12	3.93
1751-2000	9	2.95
>2000	30	9.84

**Outcome:** **Table 7** shows outcome of the patient. Total 278 (91.14%) patients survived while 27 (8.85%) patients died.

**TABLE 7: OUTCOME OF THE PATIENT (N=305)**

Outcome	No. of patients (N=305)	Percentage (%)
Survive	278	91.14
Death	27	8.85

**DISCUSSION:** Trauma is a major problem in India with severe and wide-ranging consequences for individuals and society as a whole. In this study, about 26 % patients were in the age young group 21-30 years. In our study, most common age group was 31-40 years, about 26% patients, total 23 patients were < 20 years of age and few (patients of > 70 years of age, 0.98%). A study by Ozgur Sogut *et al*, the findings were similar to this study, the commonest age group was 31-44 years (31% patients) in that study, 0.65% patients were > 75 years of age<sup>12</sup>. In another study by Sema P. *et al*,

about 76% patients were from 18-44 years of age. And 5.98% were more than 70 years of age<sup>13</sup>. A study by Tesfaye Abebe *et al*, the most common age group was 24-35 years of age (35.6%) patients, 33% patients from 14-23 years, about 3% patients were >65 years of age<sup>14</sup>.

In this study, males are more than females, 86% were males and 14% were females. The findings are similar with the study in which 71% were males while 29% were females<sup>14</sup>. In other study by Kundavaram Paul, males were 74% and 36% were females<sup>15</sup>. A study by Ozgur Sogut, males were 68% while females were 32%<sup>12</sup>. A study done in Ethiopia by Tesfaye Abebe, males were 71% females 29% were male<sup>14</sup>. In a study by Laurent G. Glance, males were 64% while 36% were females<sup>16</sup>.

The mechanism of injury in the study, fall from height followed by fall at home, pedestrian, assault, gunshot shot and others. The findings were similar in study by Frederik Trier *et al*, like fall (20.3%) is commonest followed by pedestrian injury (5.5%), violence (5.2%), stabbing (2.9%) and gunshot (0.5%)<sup>17</sup>. Other study in Ethiopia showed that fall down was commonest (23.5%) followed by fighting, (31.8%), machine injury (9.4%), stab injury (3%) and burn (1.1%)<sup>14</sup>. A study by Sema Puskulluoglu, injuries were common due to simple extremities injuries (41%), falls (33%), stab wound (10.3%), burns (1.6%), electric shock (0,2%)<sup>13</sup>. In another study by Sogut *et al* observed that falls were most frequent (36.8%), gun shit or knife injury (8.1%), burns (7.8%), homicide (6.5%) and workplace accidents (2.1%)<sup>12</sup>. The study in South India by Kundavaram Paul *et al*, fall on level ground (13.5%), fall from height (6.3%), workplace injuries (6.3%)<sup>15</sup>.

The triage priority-wise distribution results were observed triage priority 2 is common in most common mode of injury which were in accordance with our study, after priority 2, priority 3 and priority 1 were observed<sup>15, 16</sup>. In others, occupational injuries were seen in 1.3% patients which presented to us and most of them were related to heavy machinery at the workplace, with hand or leg injuries. Many of these patients required surgical intervention. This type of injuries results in huge financial loss for the person and family. It can cause permanent deformities hence immediate management is essential<sup>17</sup>.

(Road traffic accidents were the predominant cause of trauma in this study, the result is in accordance with other studies<sup>18, 19</sup>. Four-wheel vehicles offer a fair amount of protection to those inside unlike two-wheeler passengers and pedestrians who are directly exposed to the elements of the road. This explains the overwhelming majority of the accidents involving two-wheelers and pedestrians, consistent with other Indian studies<sup>19</sup>. In the study, vehicular accidents are common, among which two-wheeler accidents are commonest (39.01%), followed by four-wheeler accidents (11.47%). In two-wheeler accidents motorcycle accidents, bicycle and scooter accidents were observed. The findings are similar to a study in which 26% patients had two-wheeler accidents out of which bicycle accidents were commonest followed by motorcycle injuries<sup>17</sup>.

In another study, the results were different than this study, about 31% patients had road traffic accident, out of which pedestrians were commonest (62.1%), minibus accidents (32.5%) then passengers (26.2%) and motorcyclist (8.1%)<sup>14</sup>. A study by Sema Puskulluoglu, about 9% patients had road traffic accidents<sup>13</sup>. The commonest motor vehicular accidents were observed in 38.7% in a study by Ozgur Soguta<sup>12</sup>. In this study, two-wheeler accidents were common (59.5%) followed by four-wheeler (14%), similar pattern of injuries was noted by Goyal *et al.* in a study from rural Maharashtra<sup>20</sup>. Compulsory use of helmets must be strictly enforced not only just by the government authorities such as the police but also voluntarily encouraged by the institutions people work for. In our study, the site of injury is recorded and showed that head injury is the commonest in 76% patients

and soft tissues in 37% patients. These findings were in accordance with a study by Kerina J. Denny *et al*<sup>21</sup>. In our study, drug prescriptions were recorded and analysed. Due to emergency situations and multiple co-morbidities the number of drugs prescribed and pattern of prescriptions will vary according to patient's condition, which showed that pantoprazole was the commonly prescribed drug in 81.96% patients followed by ondansetron in 86 (28.19%) patients. In comparisons with other study in which diclofenac was the maximally prescribed drug, in 33% prescriptions.

Then ondansetron, each being prescribed in 23.11% patients and paracetamol in 22.22% prescriptions. In other study by Kelly Murray, antibiotics and analgesics are prescribed commonly followed by antiemetic drugs<sup>22</sup>. In this study, 44.76% drugs are prescribed by i.v. route, 793 (41.78%) drugs are administered via oral route and 1.73% drugs are given *via* i.m. route. While in a study by Rakesh Patidar, most common route of administration of drug was intravenous being 452 (41.85%) in number followed by intramuscular being 267 (24.72%). Least preferred routes were nasal and topical being 6 (0.55%) and 15 (1.38%) in number<sup>23</sup>.

The common FDCs prescribed were Glipizide + Metformin, in 11.80%, Aspirin + Clopidogrel in 12.78%, Amoxicillin + Clavulanic acid in 6.55% patients which are comparable with one study in which Amoxicillin + Clavulanic acid and Aspirin + clopidogrel in 18.66% and 9.01% patients respectively.

Due to multiple drugs, the direct cost burden of drugs is also high as expected, the total cost burden of drugs prescribed drugs to the patients were <1000 Rs in 52.78% patients as the essential drugs were prescribed only to the patients according to the injury and status of the patients. About 10% patients had cost burden of >2000 Rs, those with severe injury and need of multiple drugs to improve the status of the patient. Usually, i.v. drugs were administered which having higher cost than tablets for oral usage. Hence the cost is also increased. Total 9 patients have <250 Rs oof cost of drugs as the patients were stable. In this study, it is observed that 91.14% patients survived after treatment.

It indicates rational drug therapy is prescribed to the patients. Serious and co-morbid patients were died (8.85%). The survival rate is more than a study in which 85% patients survived and 15% deaths were reported<sup>22</sup>. The findings were in accordance with a study by Abhilash KP *et al* in which 56.6% patients discharged in stable condition and 41.2% of patients required admission for surgical intervention or conservative management<sup>15</sup>. In another study by Frederik Trier in Denmark for 9 years, the overall mortality was 8.92%<sup>17</sup>. Several European studies<sup>24, 25</sup> and a study from Hong Kong<sup>26</sup> have showed a 30-day mortality of trauma patients varying between 14.9% and 22.4%. In Japan, the in-hospital mortality of adult trauma patients decreased from 28.5% in 2004 to 15.7% in 2013<sup>26</sup>. The crude 30-day mortality varies substantially between major trauma centres although our crude 30-day mortality is comparable to the before mentioned studies.

**CONCLUSION:** Trauma should be treated as a public health problem requiring prompt management. Our study provides various insights into the analysis of prescribing drugs in the uniquely challenging environment of the Emergency department. The prescribed medications in the study were rational as per the patient's condition in coordination of emergency department and other departments in the tertiary care hospital, the morality rate in the study is less. Various rational Fixed Dose Combinations (FDCs) were also prescribed rationally. Hence, the cost burden of drugs was also less. We propose that future studies should be conducted aiming to explore and address factors associated with drug prescription pattern, in order to identify, and prevent irrational drug usage for the benefit to the patient and society.

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**CONFLICTS OF INTEREST:** None

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