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Role Of Clinical Pharmacist In Identifying And Managing Drug-Drug Interactions In Critical Care Unit- An Interventional Study

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ABSTRACT

The risk that one medication may change the effects of another when taken at the same time is known as a drug-drug interaction (DDI). Finding out how often and how serious pDDIs are among intensive care unit (ICU) patients is the primary goal of this research.

Finding and controlling possible DDIs is the goal of the research. Additionally, assess how well the clinical pharmacist has handled any drug-drug interactions (DDIs) in the intensive care unit.

Research Approach: The intensive care unit at Basaweshwar Teaching and General Hospital was the site of a prospective interventional trial that lasted for six months. Patients hospitalized to the intensive care unit were included in the study at random after the study requirements were considered. The results showed that out of 102 cases tested, 61 (or 59.80%) were male and 41 (or 40.29%) were female. Out of the total number of patients, 22 (or 21.57%) were between the ages of 61 and 70, and 21 (or 20.59%) were 75 and older. Of the 102 instances that were examined, 76 had DDIs. Of these, 124 (31.58%) had 1 DDI and 15 (19.74%) had 2 DDIs. Out of the 76 DDIs that were noticed, 143 (or 65.60%) were classified as major, 64 (or 29.36%) as moderate, and 5 (or 2.29%) as small. Out of the 52 DDIs that were accepted, 24 (or 31.58%) were not. For 52 of these DDIs, the advised actions were monitoring for 25 (or 48.08%) and changing the administration time for 17 (or 32.69%). The two most often interfering drugs are ondansetron and tramadol. Ondansetron and tramadol is the most frequent medicine combination, occurring 13 times, while atorvastatin and clopidogrel is the second most common, occurring 11 times. In addition, medication interactions were more common when the dosage of each medicine was raised.

Our research leads us to believe that clinical pharmacists may help stop these DDIs in the ED. Adequate understanding of the most prevalent pDDIs to permit the health care.

Keywords: Potential Drug Drug Interaction, Polypharmacy, Pharmacokinetic Interactions.

I. INTRODUCTION

POTENTIAL DRUG-DRUG INTERACTIONS:

A DDI occurs when two or more medications are taken at the same time and there is a chance that one of them may alter the other's effects. Among the main aims of this study is to determine the frequency and severity of pDDIs among patients in the critical care unit (ICU).

The study is aimed at identifying and managing potential DDIs. You should also check the clinical pharmacist's performance in dealing with DDIs in the ICU.

Methodology used in the Investigation: For six months, patients in the critical care unit at Basaweshwar Teaching and General Hospital participated in a prospective interventional study. After the study criteria were taken into account, patients admitted to the critical care unit were randomly assigned to participate in the research. Out of 102 instances that were tested, forty-one (or 40.29%) were female and sixty-one (or 59.80%)

were male. Twoteen patients (or 21.57% of the total) were in the 65–70 age range, while twenty-one patients (20.59%) were 75 and over. The number of occurrences with DDIs was 76 out of 102 that were investigated. Two DDIs were found in fifteen cases (19.74%), whereas 124 cases (31.58%) had one. Among the 76 DDIs identified, 65.60 percent were deemed large, 29.36 percent were deemed moderate, and 2.29 percent were deemed little. Thirteen percent, or 24 DDIs, were rejected out of fifty-two that were approved. Changing the administration time for 17 (or 32.69% of the 52 DDIs) and monitoring for 25 (or 48.08%) were the recommended interventions. In terms of medication interactions, ondansetron and tramadol are the two most common culprits. Thirteen occurrences of ondansetron and tramadol rank most among all medication combinations, with eleven occurrences of atorvastatin and clopidogrel ranking second. Raising the dose of any drug also increased the likelihood of drug interactions.
Based on our findings, clinical pharmacists have the potential to put an end to these DDIs in the emergency department. Medical professionals have a good grasp of the most common pDDIs. [03]

CAUSES OF DRUG INTERACTIONS

1. Dosing with several medications at once - The term "Therapeutic Jungle" or "Polypharmacy" describes the typical pattern of prescribing many medications simultaneously.

2. Patients seeing many doctors—If a patient is unhappy with their current doctor, they may choose to see another doctor without disclosing their medical history.

3. Patient’s non-adherence – Sometimes patient doesn’t comply with the instructions given by the physician and may consume foods that are been prohibited which can result in drug-food interactions.

PHARMACOKINETIC INTERACTIONS:

Interactions that influence the absorption, distribution, metabolism, and excretion of medications are known as pharmacokinetic interactions.

Drug absorption interactions:

The rate of absorption is often irrelevant for long-term, multiple-dose medications (such as oral anticoagulants) as long as the overall quantity of drug taken remains relatively constant. Meanwhile, a decrease in the rate of absorption might lead to insufficient efficacy for fast-absorbing, one-time-dose medications (such as hypnotics or analgesics) that need a high concentration to be reached quickly.

1. Implications of alterations in gastric pH
2. Various complexing processes, include adsorption and chelation
3. Modifications to the movement of the intestines
4. Activation or suppression of protein transporters for drugs
5. Substandard medication absorption

Drug distribution:

When carried via plasma, some medications dissolve entirely in the water, while others have a fraction of their molecules in solution and the remainder attached to proteins in the plasma, especially albumins. There is a wide range in the degree of binding, however certain medications are quite bound.

1. Protein-binding interactions.
2. Induction or inhibition of drug transport proteins.

Metabolism (biotransformation):

Most medications undergo chemical changes in the body to form less lipid-soluble molecules that are easier for the kidneys to excrete, however other pharmaceuticals are eliminated from the body only by being passed out in urine unaltered. If this weren't the case, a lot of medications would stay in the system and keep

working for a long time. Metabolism, biotransformation, biochemical breakdown, and detoxification are terms that describe this chemical shift.

1. Changes in first-pass metabolism
2. Enzyme induction
3. Enzyme inhibition
4. Genetic factors in drug metabolism
5. Cytochrome P450 isoenzymes and predicting drug
6. Interactions

Drug excretion interaction.

(a) Changes in urinary pH
(b) Changes in active renal tubular excretion
(c)Changes in renal blood flow
(d) Biliary excretion and the entero-hepatic shunt

PHARMACODYNAMIC INTERACTIONS

In pharmacodynamic interactions, the presence of another drug at the site of action of the first medication alters the effects of the first drug. Beta2 agonists like salbutamol and beta blockers like propranolol fight for specific receptors directly; however, the response is typically more indirect and includes interference with physiological processes. Unlike pharmacokinetic interactions, they are not easily categorised.

i. Additive interactions:
An additive interaction may occur when two medications with identical pharmacological properties are administered together.

ii. Synergism interaction:
An interaction between 2 or more drugs that causes total effect of the drugs to be greater than the sum of the individual effects of each drug

iii. Antagonistic or opposing:
Unlike additive interactions, there exist medication combinations whose activity are diametrically opposing. [16]

The DDIs are identified and categorized according to the drug profiles. Possible DDIs are categorized as follows, based on their severity:

1. MAJOR: There is a real risk that the consequences might be fatal or severely damaging.
2. MODERATE: Potentially worsening patients' clinical Hospital stay length, status, and any necessary supplementary treatments
3. MINOR: Typically, they have a minor impact.

Adverse drug reactions (ADRs) caused by medication interactions might be serious enough to need hospitalization and raise healthcare expenses. Most DDIs are preventable, and they account for about 5% of all hospital ADRs. [04]

WHY IN CRITICAL CARE UNIT PATIENTS ONLY

Critical care units (ICUs) are a subspecialty of emergency medicine that focus on the assessment, treatment, and monitoring of patients who are in a very critical condition. On a number of points, it necessitates the involvement of other medical specialties.[19] It is important to research possible drug-drug interactions in the critical care unit since patients there are administered a lot of medicines.

Because of the complexity of the illness and the organ failure that might affect the pharmacologic response to drugs, patients in the intensive care unit (ICU) are at an exceptionally high risk of developing drug interactions. Treatment becomes more complicated when there are more drugs being used, more doctors treating the same patient, and older patients in the intensive care unit are additional risk factors for the development of drug-drug interactions. [20]

Compared to patients in other care units, those in the intensive care unit (ICU) are more likely to have medication interactions while hospitalized. The seriousness of illness and organ failure, together with the use of several pharmacological therapies, made intensive care unit patients a potential threat. Interactions between drugs are a common cause of adverse events in intensive care units and an often overlooked problem in pharmacotherapy.[17]

Patients experiencing a life-threatening acute sickness or trauma often benefit from intensive care treatment. Improvements in diagnosis, technology interventions, and pharmaceuticals have led to these advantages. In order to provide pharmacotherapeutic support and perhaps a cure for a medical disease, critically sick patients often undergo multiple regimens. The polypharmacy in these individuals is complicated, and they often have impaired organ function, both of which increase their risk of drug interactions (Dis). The existence of several co-morbid illness conditions makes critically sick elderly people further more susceptible to AES from Dis.

Avoidable drug-drug interactions (DDIs) account for the vast majority of the 5% of adverse drug responses in hospitals. Considering the growing patient load. With the prevalence of several illnesses and the complexity of treatment regimens, poly-pharmacy is becoming an inevitable part of intensive care unit medication management. The chances of medication adverse events, particularly the DBDIS, are increased with polypharmacy, which in turn raises healthcare expenditures, morbidity, and death. It is critical to examine possible DDIs in ICUs in light of the aforementioned factors. **[12]**

II. REVIEW OF LITERATURE

Arvind N K et al examined the incidence, variables impacting the incidence, and severity of PDDIS in patients admitted to the hospital. All of the medical wards participated in this six-month prospective trial. A total of seventy-seven individuals, or 32% of the 240 patients examined, had PDDİS. The PDDIS frequency was determined to be 44%. Patients got medication dosages ranging from three to ten milligrams. The degree of the PDDIS that the majority of patients encountered was moderate (60%), while 37.5% had severe (37.5%) and just 2.5 % mild (2.5%). The incidence of PDDIS was shown to rise as both the patient's age and the amount of their prescription rose. Both the prescription amount and the age of the patients' pDDIs were positively correlated. Statins were the second most common cause of pDDIs, behind proton pump inhibitors (PPls). Moderately severe pDDIs (risk rating D) between PPls and paracetamol and PPls and clopidogrel were the most common. Better patient care is surely possible with routine monitoring of pDDIs, according to the research. **[01]**

Jimmy O.D et al performed research on the topic of medication charts at tertiary care hospitals' medicine wards, specifically looking at drug-drug interactions. Its prospective study's objective was to examine patients' medication records for evidence of drug-drug interactions. Using drug information sites such as "Thomson Reuters micromedex 2.0 drugdex anddrugs.com," we analyzed the data of all patients admitted to the Female Medical Ward and MICU for drug-drug interactions. From the total of 230 patients, 120 (52.17% of the total) were found to have 330 DDIs, with 10 (or 3.13% of the total) being clinically seen and the remaining 320 being considered potential DDIs. The pharmacodynamic type accounted for the vast majority of the probable DDIs (80.86%). Of the 330 DDIs that were found, 82 (or 24.85%) were considered large, 176 (53.33%) were considered moderate, and 72 (21.82%) were considered small. In 35% of the prescriptions, at least one possible DDI was found. According to the study's findings, clinical studies are necessary to determine the true impact of DDIs, even if they may not seem to pose a significant threat to patients' health and the process of medication treatment. **[04]**

S. V. Doubova et al analyzed prescriptions from ambulatory patients over the age of 50 at family medicine clinics in Mexico City for possible drug-drug and drug-disease interactions. Patients' demographics, health histories, and prescription use were among the data points gathered. Six hundred twenty-four outpatients (OPs) visiting two IMSS family medicine clinics in Mexico City for the treatment of non-malignant pain syndrome were included in the research. The patients were given non-opioid analgesics with a 7-day supply. By using the Thompson Micromedex tool, the possible interactions were discovered. Descriptive statistics, bivariate analysis, and multiple logistic regression were used to examine the data. The average amount of medications administered was 5.9 ± 2.5, according to the states. Prescriptions for over 80% of patients indicated the possibility of at least one medication-drug interaction, and for 3.8% of patients, the prescriptions included drug combinations with known or suspected harmful interactions. One or more possible drug-disease interactions may have occurred as 64.0% of patients had prescriptions. Patients aged 60 and more, those with cardiovascular disease, and those taking five or more medications all had a higher risk of experiencing at least one possible interaction. It seems that primary care physicians often prescribe medications with significant potential for drug

interactions, according to the study's conclusions. If other treatment choices cannot be considered carefully, patients should be closely monitored for adverse effects in order to reduce the frequency of possible interactions. [07]

Aline Teotonio Rodrigues et al performed research on the clinical significance and hazards of possible drug-drug interactions in the context of intense treatment. The purpose of this study was to use the Micromedex database to analyze the possible drug-drug interactions (pDDI) that were found in the prescription orders of adult patients in the intensive care unit (ICU) of a public hospital in Brazil. The researchers aimed to quantify and qualify the pDDI based on their severity and the risks they posed to the critically ill patients. This research leads to The research found 1844 pDDIs, which were then divided into 405 pairs, each consisting of a combination of medicine A and medication B. The average number of pDDIs per prescription order was 5.00 ± 5.06, with moderate interactions accounting for 74% and important interactions for 67% of prescription orders, respectively. The overall number of pDDIs was 204 moderate, 129 important, and 9 contraindicated. Of these, 306 were advised to undergo "continuous and sufficient monitoring," while 52 were told to "avoid concurrent use" or "suspension of medicine." Results from the study's assessment of the clinical relevance of the most common pDDIs in the intensive care unit (ICU) and the large number of pDDIs overall indicate that significant and moderate interactions occur often. For safe and personalized risk management, knowing these interactions is crucial, as most of them need monitoring and proper management. [08]

Hammes JA et al performed research on the frequency of possible medication interactions in critical care units. Over the course of two months, a cross-sectional research included all patients from three critical care units. All patients were eliminated if their duration of stay was shorter than two days. We documented all conceivable matched drug-drug combinations and analyzed data from twenty-four-hour prescriptions. At the conclusion of the follow-up period, we assessed for prevalence and clinical value (significance). Out of the 1069 prescriptions examined, 39.2% revealed the same potential for medication interactions, and 67.1% of the 145 individuals studied showed signs of at least one substantial interaction. We identified 29 extremely significant medication interactions out of 188 total. The group with substantial potential medication interactions had more prescription doctors, a longer length of time in the critical care unit, a larger number of different prescriptions taken daily, and more drugs overall, according to the univariate analysis. Only the number of medicines taken daily corresponded with an elevated risk of significant possible drug interactions when adjusted for the multivariate logistic regression model ($p = 0.0011$). Using more than six drugs daily raised the relative risk by 9.8 times. The research found that the number of medications used daily is a strong predictor of the likelihood of drug interactions, and that critically ill patients are more vulnerable to this risk. Consequently, critical care doctors must be vigilant at all times to identify this issue and provide suitable treatment strategies, thereby decreasing the likelihood of negative consequences. [09]

III. OBJECTIVES

General objective:

Methods for detecting and controlling DDIs are the focus of this research. Additionally, assess how well the clinical pharmacist has handled any drug-drug interactions (DDIs) in the intensive care unit.

Specific objectives:

1. To assess socio-demographic data of patients admitted to the critical care unit.
2. To assess the diagnosis of patient for admission & co-morbidities.
3. To assess poly-pharmacy prescriptions.
4. To assess the duration of hospital, stay.
5. To identify and report DDI’s
6. To intervene and manage DDIs.
7. To classify the drug interactions as per severity and documentation.

III. METHODOLOGY

Source of data:
Data will be collected from case sheets of In-patients admitted in critical care unit, except PICU.

Method and collection of data:

Study site: Study was conducted at HKES's Basaveshwar Teaching and General Hospital, Kalaburagi.
Study duration: The study was carried out for a period of 6 months.
Study design: "A Prospective Interventional study"
Study Criteria: Patients were enrolled into the study by considering study criteria.

- **Inclusion criteria:**
  1. Prescriptions with minimum 2 drugs.
  2. Patients of any age group.
  3. Patients of either gender.
  4. Patients who are admitted in different critical care units for more than 24hours.
  5. Patients with or without co-morbidity.
  6. Patients who are willing to participate in the study.

- **Exclusion criteria:**
  1. Patients who are not willing to participate in the study.
  2. Geriatric patients who are terminally ill.
  3. Out-patients are excluded from the study.

Case study procedure:

A Prospective Interventional study is carried out after obtaining ethical clearance from Institutional Review Board (IRB) and with prior permission of M.S (medical superintendent), BTGH. The study is carried out for a period of 6 months in critical care units of Basaveshwar general and teaching hospital, Kalaburgi. The study is conducted by enrolling patients admitted to critical care unit, by considering the study criteria. A written consent is taken from the enrolled patients. From the case sheets of the enrolled patient's demographic, socio-economic data, reason for admission, co-morbidities, medical and medication history is noted in a suitably designed data collection form. The DDIs is identified and analysed by using micromedex data base. The identified DDIs is brought to the notice of the physician/prescriber and possible measures is taken to avoid the interactions. The action taken by the physician/prescriber for the suggestions given by the clinical pharmacist to avoid the DDIs is also been noted.

IV. RESULTS

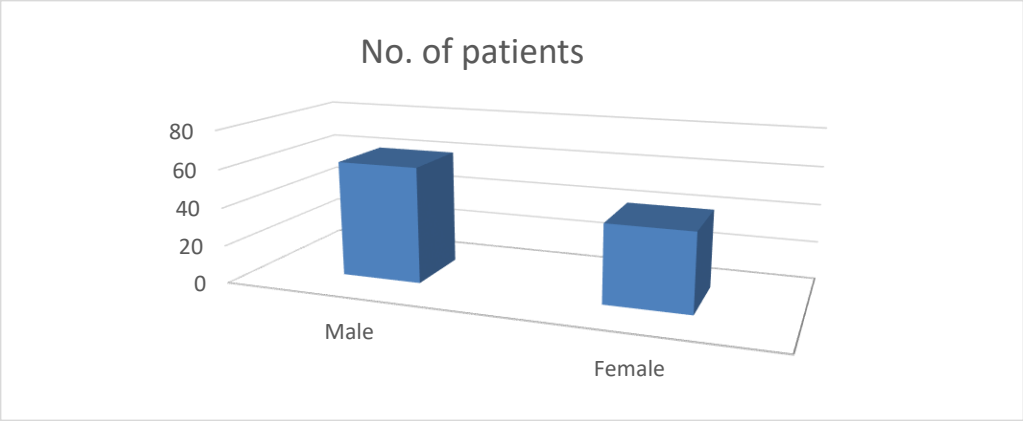
1. Gender Distribution of Patients:

Among 102 patients enrolled in the study, there were 61(59.80%) Males and 41(40.20%) Females

Table-1: Gender Distribution of Patients

Gender	No. of patients	Percentage(%)
Male	61	59.80
Female	41	40.20
Total	**102**	**100.00**

Fig-1: Gender Distribution of Patients



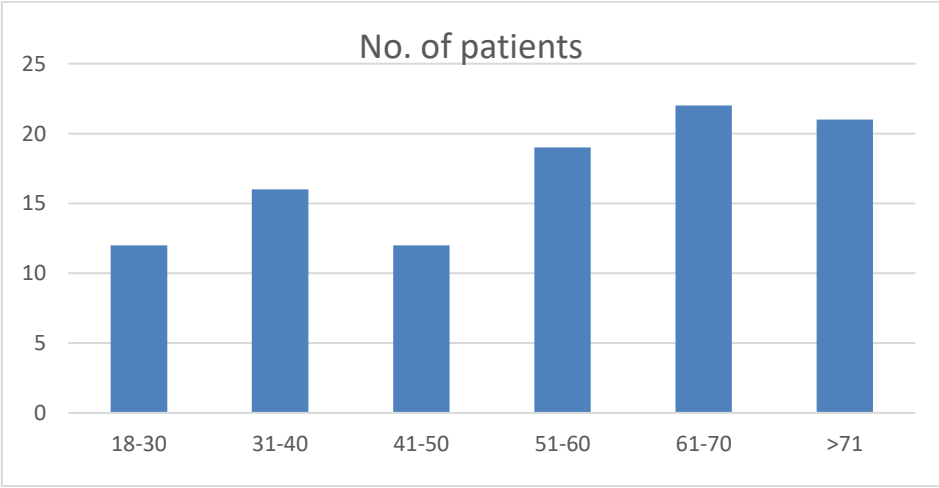
2. Age Distribution of Patients:

Age distribution of patients showed that there were 22(21.57%) patients of age group 61-70 years followed by 21(20.59%) patients of age group above 71-years. The patients of age group 51-60 years 19(18.63%). 16(15.69%) are patients of age group between 31-40-years. 12 (11.76%) are the patients age group between 41-50 years & 18-30 years.

Table.2 Age Distribution of the patients

Age group	No. of patients	Percentage (%)
18-30	12	11.76
31-40	16	15.69
41-50	12	11.76
51-60	19	18.63
61-70	22	21.57
>71	21	20.59
Total	**102**	**100.00**

Fig-2: Age Distribution of Patients



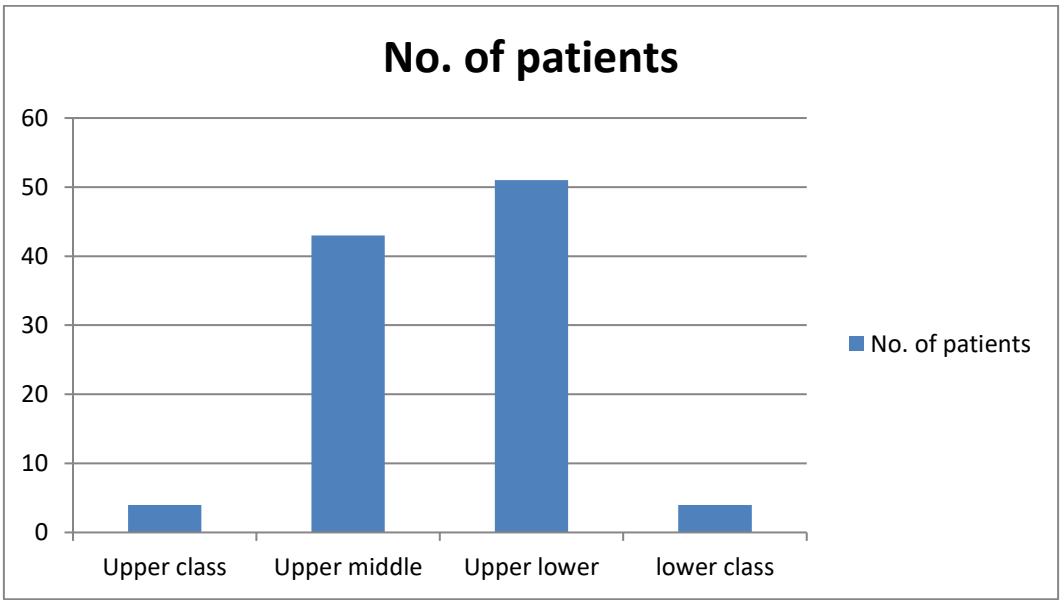
3. Distribution of patients on socio-economic status of Patients:

Among 102 patients 51(50.00%) patients were Upper class , 43(42.16%) patients were upper middle, 4(3.92%) patients were upper class and lower class

Table-3 Distribution of patients on socio-economic status of Patients

Socio-economic Class	No. of patients	Percentage (%)
Upper class	4	3.92
Upper middle	43	42.16
Upper lower	51	50.00
lower class	4	3.92
Total	**102**	**100**

Fig-3 Distribution of patients on Socioeconomic status of Patients



4. Duration of Hospital stay:

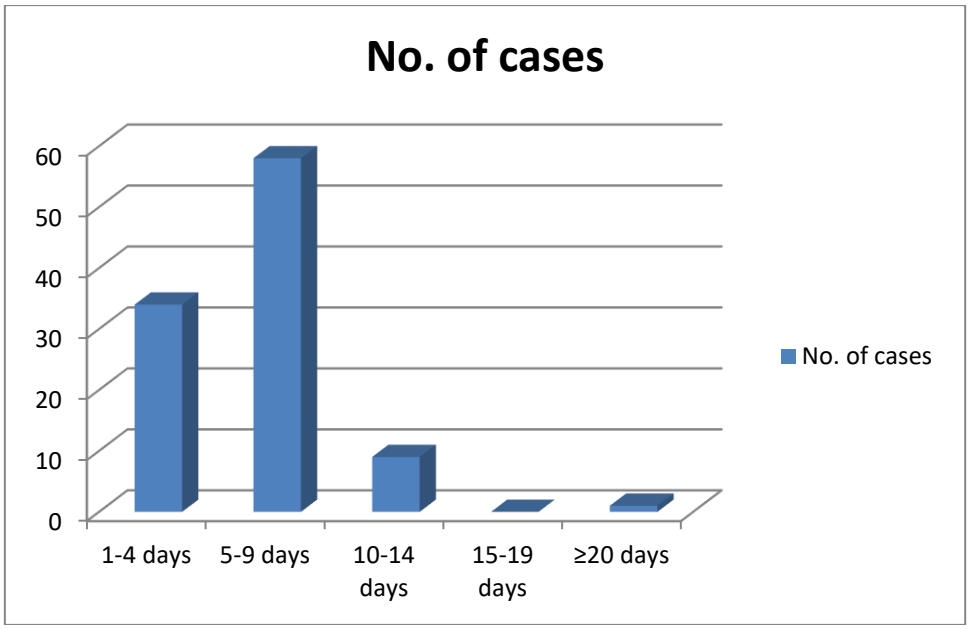
Out of 102 patients 58(56.86%) stayed for 5-9 days followed by 34(33.33%) stayed 1-4 days, 9(8.82%) stayed 10-14 days and 1(0.98%) stayed ≥20 days.

Table-No.4: Distribution based on duration of stay at hospital

No. of Days	No. of cases	Percentage(%)
1-4 days	34	33.33

5-9 days	58	56.86
10-14 days	9	8.82
15-19 days	0	0.00
≥20 days	1	0.98
Total	**102**	**100.00**

Fig-4: Distribution based on duration of stay at hospital



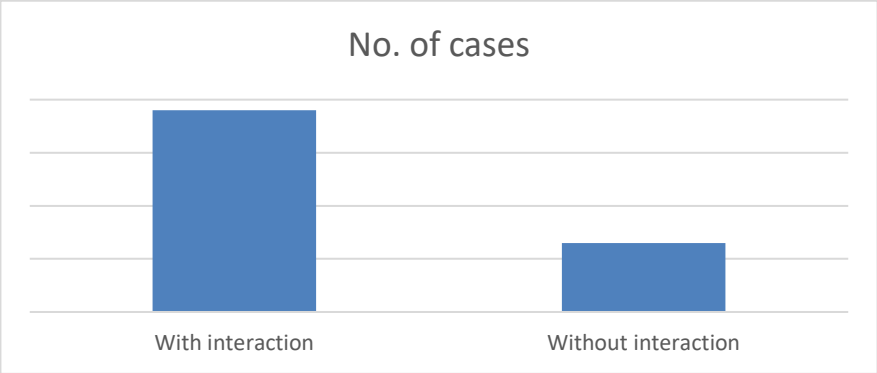
5. Cases of DDIs:

Among 102 patients observed, the cases with interaction were 76(74.51%) and without interaction were 26(25.49%).

Table-5: Distribution of cases based on Presence /Absence of interactions

Drug interaction	No. of cases	Percentage(%)
With interaction	76	74.51
Without interaction	26	25.49
Total	**102**	**100.00**

Fig-5: Distribution of cases based on Presence/Absence of Interactions



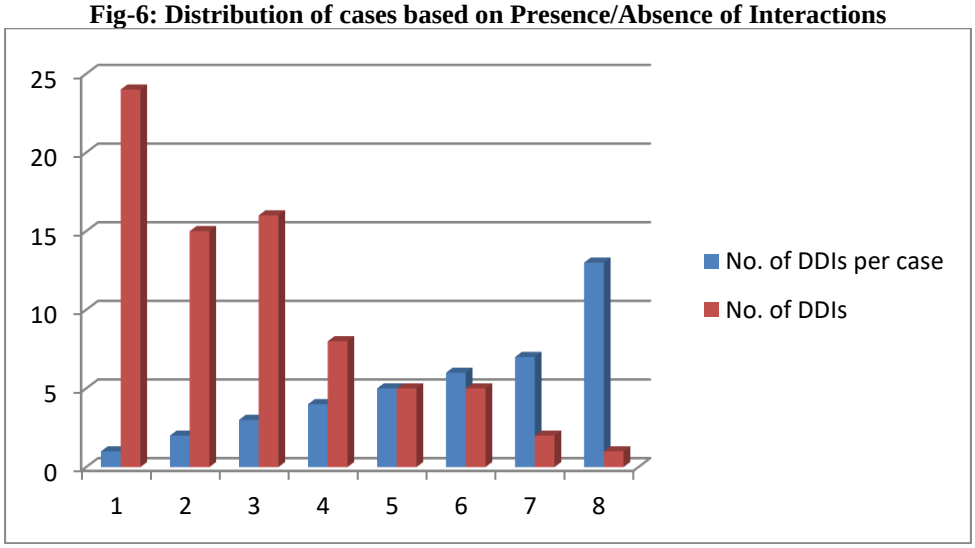
6. Number of DDIs per case:

Among 76 patients containing the DDIs the cases with 1 DDI were 124(31.58%) , cases with 2 DDIs were 15(19.74%) cases with 3 DDIs were 16(21.05%), cases with 4 DDIs were 8(10.53%), cases with 5 and 6 DDIs were 5(6.58%), cases with 7 DDIs were 2(2.63%), cases with 13 DDIs 1(1.32%).

Table-6: Distribution based on number of DDI per case

No. of DDIs per case	No. of DDIs	Percentage(%)
1	24	31.58
2	15	19.74
3	16	21.05
4	8	10.53
5	5	6.58
6	5	6.58
7	2	2.63
13	1	1.32
Total	**76**	**100.00**

Fig-6: Distribution of cases based on Presence/Absence of Interactions



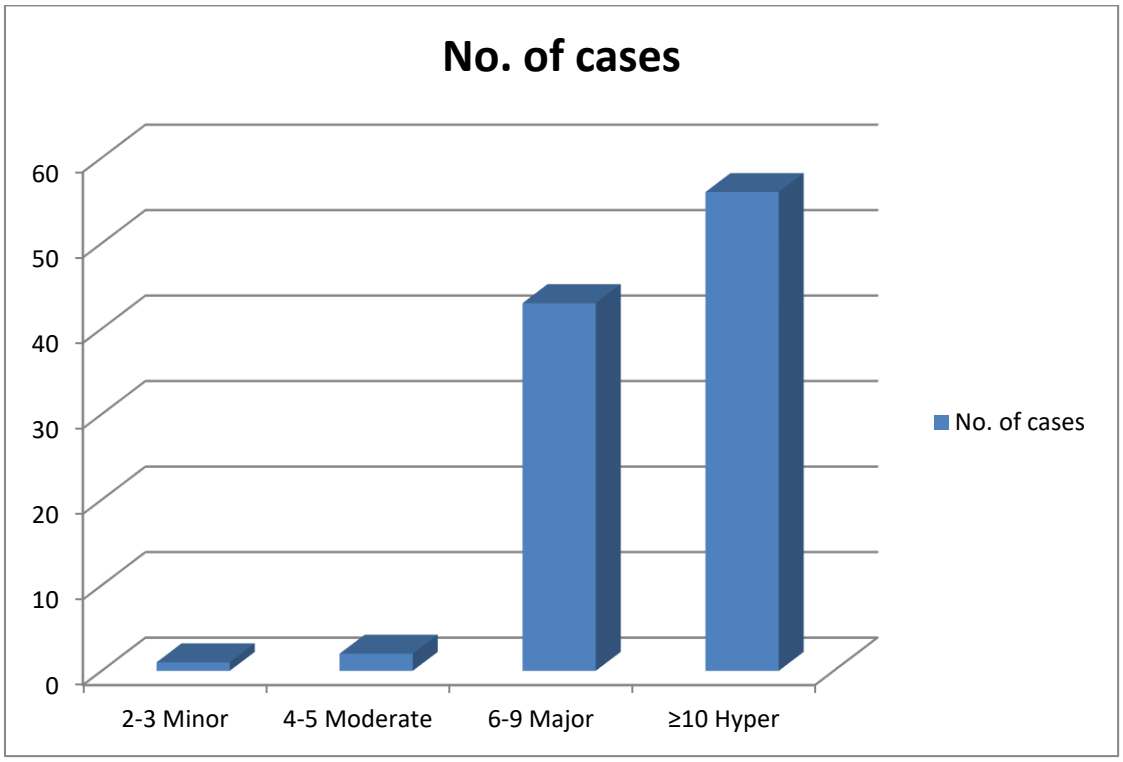
7. Polypharmacy in Prescription:

Among the 102 patients, 56(54.90%) were (≥10) hyper, 43(42.16%) were (5-9) major, 2(1.96%) were (4-5) moderate and 1(0.98%) were (2-4) minor.

Table-7: Distribution of prescriptions based on type of Polypharmacy.

Type of polypharmacy	No. of cases	Percentage(%)
Minor (2-3)	1	0.98
Moderate (4-5)	2	1.96
Major (6-9)	43	42.16
≥10 Hyper	56	54.90
Total	**102**	**100.00**

Fig-7: Distribution of prescription based on type of Polypharmacy



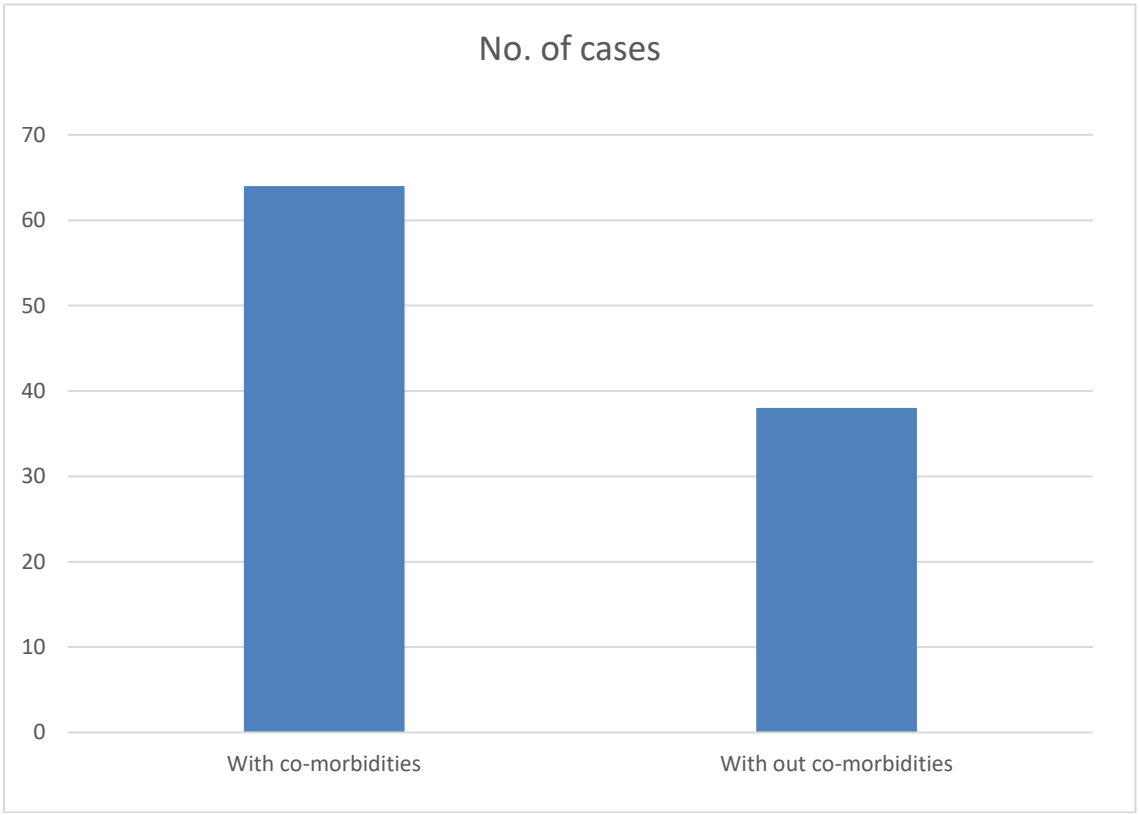
8. Co-morbidities:

Among 102 patients enrolled in the study patients having co-morbidities were 64(62.75%) and patients without co-morbidities were 38(37.25%).

Table-8: Distribution of cases based on the presence /absence of Co- morbidities

Cases	No. of cases	Percentage(%)
With co-morbidities	64	62.75
With out co-morbidities	38	37.25
Total	**102**	**100.00**

Fig-8: Distribution of cases based on the presence /absence of Co-morbidities



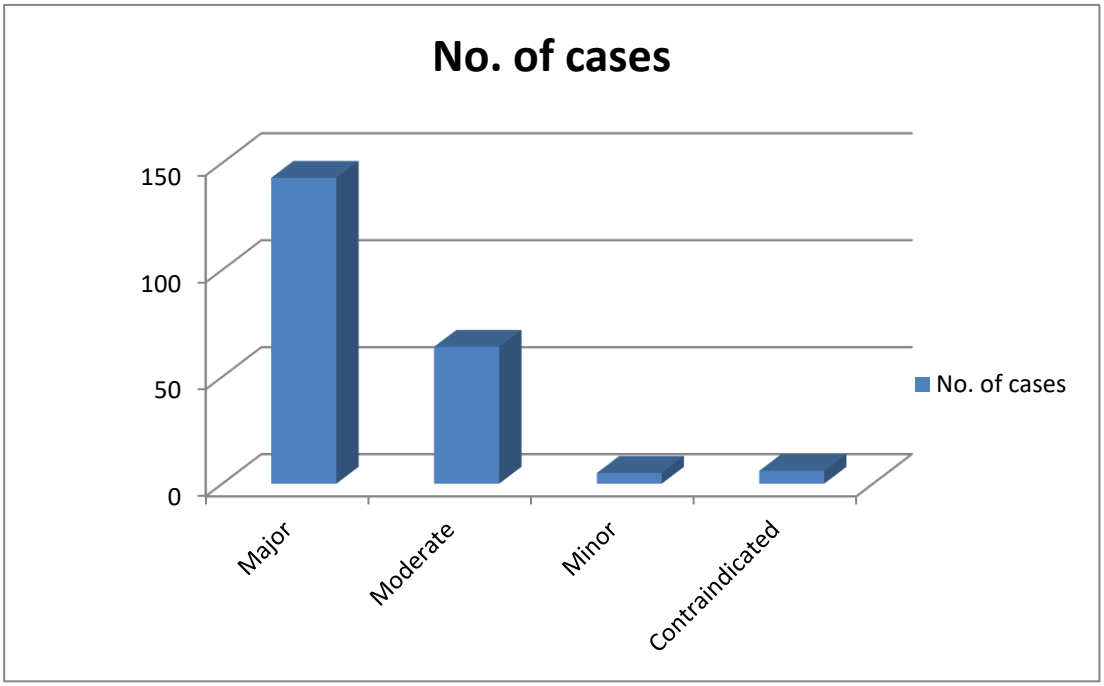
9. Severity using Micromedex:

Among 218 DDIs, the DDIs **observed** major severity were 143(65.60%), moderate severity was 64(29.36%), minor severity was 5(2.29%), and contraindicated were 6(2.75%).

Table-9: Distribution of DDIs according to severity

Severity level	No. of DI	Percentage(%)
Major	143	65.60
Moderate	64	29.36
Minor	5	2.29
Contraindicated	6	2.75
Total	**218**	**100.00**

Fig-9: Distribution of DDIs according to severity



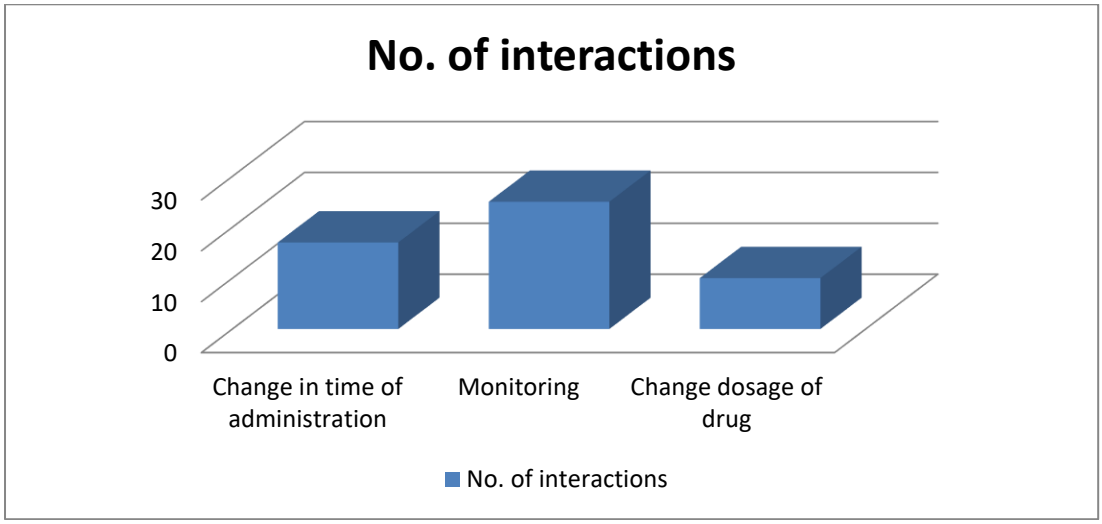
10. Action suggested:

The following are suggested for 52 DDIs recorded .The most common action suggested was monitoring the possible DDIs 25(48.08%), followed by change in time of drug administration 17(32.69%), and followed bychange in dose and dosage of drug 10(19.23%).

Table-10: Distribution based on action suggested

Actions	No. of interactions	Percentage(%)
Change in time of administration	17	32.69
Monitoring the possible DDIs	25	48.08
Change dosage of drug	10	19.23
Total	**52**	**100.00**

Fig-10: Distribution based on action suggested



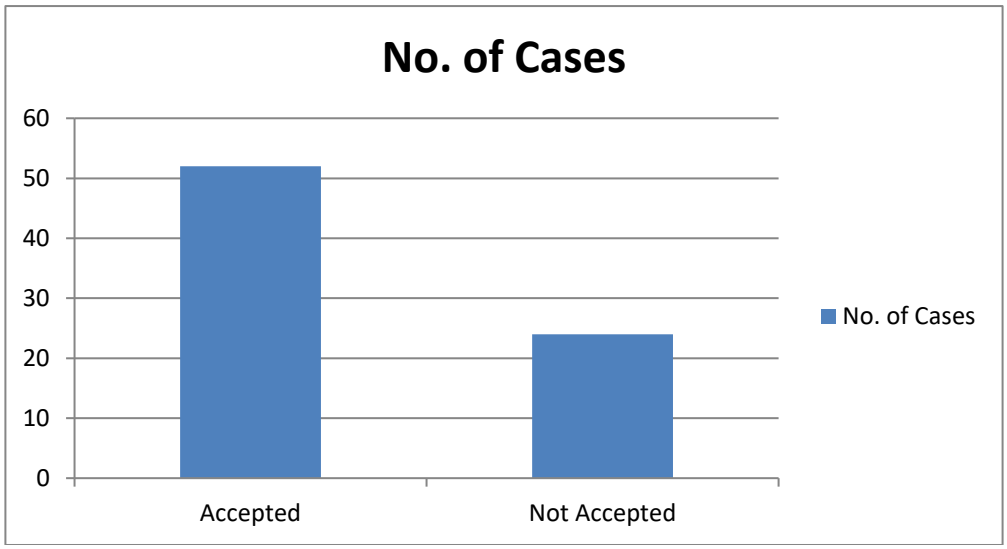
11. Action taken by physician:

Among 76 DDIs 52(68.42%) were Accepted and 24(31.58%) were Not Accepted**.**

Table-11: Distribution based on action suggested

Action taken	No. of Cases	Percentage(%)
Accepted	52	68.42
Not Accepted	24	31.58
Total	**76**	**100.00**

Fig-11: Action taken by the physician



12. Top-Ten Interacting Drugs :

Table-12: Top-Ten Interacting drugs

The following drugs were found to be most interacting**.**

Sl.No	Name of Drug	No. of times of interaction
1	Ondansetron	34
2	Tramadol	18
3	Telmisartan	15
4	Clopidogrel	14
5	Levofloxacin	10
6	Clarithromycin	9
7	H. Actrapid	9
8	Diclofenac, Spironolactone, Theophylline	6
9	Atorvastatin, Pantoprazole	4
10	Metformin, Potassium chloride, Codeine, Heparin, Methlpredinisolone, Metronidazole	3

13. Six most common drug combinations:

The following combination of drugs were found to be commonly interacting**.**

Table-13 Six common drug combinations

Sl.No	Drug Combinations	No. of Time Observed
1	Ondansetron + Tramadol	13
2	Atorvastatin + Clopidogrel	11
3	Metrogyl + Ondansetron	10
4	Levofloxacin + Ondansetron	10
5	Clarithromycin + Ondansetron	5
6	Atorvastatin + Clarithromycin	5

V. DISCUSSION

In the 102 patients were considered from the ICU units of all departments for 6 months from March 2023 to August 2023. The aim was to investigate the presence of pDDIs in critically ill patients, who are higher risk for developing serious complications and mortality.

Among 102 patients enrolled, the gender distribution of the patients showed that DDIs were more in 61(59.80%) males than the 41(40.20%) females. Our findings were found to be similar to studies carried out by Abideen et al[10] 47(65.27%) males & 25(34.72%) females.

Age distribution of Patients Among 102 patients enrolled, the age distribution of patients reveals that there were 22(21.57%) patients of age group 61-70yrs followed by 21(20.59%) patients of age group above 71yrs. In another study conducted by Ramam Sripada et al[7] 51-60yrs (27.8%) followed by 61-70 yrs (22.9%) were found .

The modified kuppuswamy scale is commonly used to measure socio-economic status of 102 patients included in the study. The factors included for this study are income, education, employment, community safety and social support. Our study results showed that 4(3.92%) were upper class and lower class 43(42.16%) patients were upper middle, followed by 51(50.00%) patients were upper lower class.

Number of DDIs per case Among 102 patients enrolled into the study the results showed that 76 cases had DDIs. The results showed that the cases with 1 DDI were 24(34.58%) with 2 DDIs were 15(19.74 %) Cases with 3 DDIs were 16(21.05%). The studies conducted by Abideen et al[10] 65(90.02%) of patient experienced at least 1 potential DDI. A total of 222 numbers of DDIs were established during the study period with an occurrence rate of 3.08 DDIs per patient.

Distribution based on Presence/absence of Drug-Drug interaction, the study results showed that the cases with interaction were 76(74.51%) and without interaction were 26(25.49%) the study carried by Abideen et al[10] found only 7(9.72%) patients without any drug interaction & 149(67.11%) with interactions.

Based on severity, the study results showed that major were 143(65.60%), Moderate were 64(29.36%), followed by Minor 5(2.29%). Our findings were found to be similar with Ramam Sripada et al[7] 29.9% were of major severity , 63.3% were of moderate severity 6.8% of interactions of minor severity.

Among 218 DDIs reported the following drugs were found to be most interacting; Ondansetron (34), Tramadol(18), Telmisartan(15), Clopidogrel (14), levofloxacin(10), Clarithromycin (9), H.Actrapid (9),

Diclofenac, spironolactone, Theophylline :(6), Atrovastatin, Pantoprazole:(4), Metformin, Potassium chloride, Codeine, Heparin , Methlypredisolone, Metronidazole(3). Among all 10 drugs ondansetron and tramadol are mostly interacting drugs.

The duration of hospital Stay of 102 patients enrolled in study was 5 Days, were as the study conducted by Cristiano. M et al [13] the duration of the patients enrolled in the study was 6 days.

Among 102 patients enrolled into the study of Polypharmacy, the results showed that 56(54.90%) were (≥10) hyper , 43(42.16%) were (5-9)major, were as study conducted by Nashwa Masnoon et al[11] were Hyper 2(1.8%) major 12(10.9%). In the study patients having co-morbidities were 64(62.75%) and patients without co-morbidities were 38(37.25%).

VI. CONCLUSIONS

Among 102 cases analysed the prescription of 76 patients had the pDDIs. Among 76 cases, 218 DDIs were found. Our study reveals that majority of pDDIs were majorly based on severity and majority of interactions which falls under micromedex. The possible factors that cause pDDIs are age, co-morbid conditions and polypharmacy. As length of stay increases, the polypharmacy increases insulting in a greater number of pDDIs. The majority of pDDIs can be avoided just by changing the time of administration and the rest of pDDIs require monitoring.

In a nutshell, we conclude that, clinical pharmacist can play important role in critical care unit in reducing and avoiding these pDDIs. The population in critical care unit have multiple co morbidities which often require high risk medication and need of time sensitive medication decisions. Routine ward rounds, frequent monitoring of drugs and lab data, assisting the physician to select the drugs and dosage forms reduces such pDDIs.

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