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Original Article

Direct Intercession Approach by Clinical Pharmacist to Manage Medication Related Problems for Enhanced Patient Care

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ABSTRACT

Background: Medication related problems (MRPs) leads to patient harm and healthcare burden as develops frequently in general practice and hospital setup. To enhance therapeutic outcome; active intercessions by clinical pharmacist through meticulous prescription review to reduce prescription errors are strongly recommended. Studies in abroad shown that clinical pharmacist led medication review enhances therapeutic outcome through suitable therapeutic elucidation. In India, this practice restricted merely reporting but direct intercessions to modify the therapy rarely reported. Hence the present study is planned to provide appropriate and referred modification for identified MRPs as a direct patient care process with main axiom 'better patient care'. **Methods:** This 'prospective open-label observational clinical cohort' study conducted between August'19 and January'20 at Gandhi Hospital, Secunderabad, India. Collected cases simultaneously reviewed to identify MRP, thoroughly crossed matched with standard reference, justified and reported to doctor with suitable modification suggestions. **Results:** Result highlights; equal distribution of patient sex and vast distribution of age from neonates to elderly. Diagnosis has no co-relation on MRP development. Antibiotics, gastro-protective and anticoagulants are with maximum frequency to develop MRPs and entail strong vigilance. Furthermore drug toxicity, drug duplication, wrong dose and prescribing errors are most recurrent appeared problems. Subsequently appropriate modifications were suggested for every identified MRP and were closely observed till discharge for final outcome. **Conclusion:** Certain MRPs are frequently emerging and needs tackling with proper management strategy. Our study further highlights about necessitate of clinical pharmacist intercession in optimizing drug therapy by providing proper medication information and same has been accepted and appreciated by various doctors.

Key words: Clinical pharmacist intercession, Enhanced patient care, Medication related problems.

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INTRODUCTION

Medication related problems (MRPs) are defined as any preventable event that may cause or lead to inappropriate medication use or patient harm and such events may be related to professional practice, health care products, procedures and/or systems including; prescription writing and prescription order communication.[1] Due to vast quantity of drugs and their numerous guidelines related to administration, it become almost unfeasible for the any doctor to follow those guidelines as a near perfect manner while writing a drug for a particular patient condition. These circumstances give rise to development of frequent MRPs in general practice and also in hospital setup.[2] Furthermore to overcome such issues, few constructive steps can be adopted like; introducing automated systems or uniform prescribing charts in order to avoid transcription and omission errors. Along with this, feedback control system for each prescription and immediate review of prescriptions before dispensing or even before actual administration can be performed with the assistance of a clinical pharmacist, this process found to be beneficial for enhanced patient care in few institutions. Finally, prescription audits should be performed periodically to identify MRPs and suitable methods to overcome such issues.[2] To enhance the therapeutic outcome of each patient an active intercessions by clinical pharmacist who are trained to review the appropriateness of prescribed medicine with primary aim to reduction in prescription errors and prescribing faults are strongly recommended. Studies conducted earlier in abroad have shown that clinical pharmacist led medication chart review enhances the therapeutic outcome by identifying and resolve these errors by providing suitable therapeutic solutions.[3-6] Clinical Pharmacists are capable to play a significant role in identification and modification of MRPs by constant prescription review along with pharmacist's intervention based on patient interview and follow-up. This practice can reduce the number of readmissions and emergency department visits also.[7] Similarly in India clinical pharmacist activities including MRP identification and reporting is well established but subsequent clinical pharmacist lead intercession of MRPs to modify the therapy are not much reported as the modification entirely lay in the hand of doctors only. Therefore, we have aimed to provide appropriate and referred alternative to identified MRPs so as to involve in direct patient care process. We have initiated this approach in different In-patient units of Gandhi hospital (a tertiary care multi super-specialty government medical college and hospital at Secunderabad) where MRPs was identified by the clinical pharmacist during medication chart review and same were reported instantaneously to the visiting doctor and subsequent modifications were suggested to resolve those errors as a clinical pharmacist intercession approach.

MATERIALS AND METHODS

This 'prospective open-label observational clinical cohort' study was conducted between August 2019 and January 2020 at different in-patient units of Pediatrics, General Medicine, General Surgery, Obstetrics and Gynecology, Gastroenterology and Psychiatry departments of Gandhi Hospital, Secunderabad, Telangana, India, after obtaining necessary approval and permission (IEC approval No- CMRCP/IEC/2019-20/02).

In-patient units of selected departments were visited on a daily basis to collect cases for this study according to inclusion criteria which includes confirmed cases of MRP present in the In-patient department along with complete medical information till discharge of all ages and genders. Cases admitted due to preadmission MRPs, cases with pre-existing medication issues were excluded from the study. Cases of pregnant women were also excluded from the study as they are frequently present with nausea, vomiting, peripheral edema, decreased hemoglobin level etc. which makes the judgement difficult whether this is due to drug related or physiological. To conduct the study in a proper manner, we visited the in-patient units of different departments on a regular basis and review individual patient's case report carefully to identify any drug related problems. Once any prescription was suspected for MRP it was thoroughly analyzed and with the support of various reference resources to justify the occurrence of MRP. Subsequently reported the same to the visiting doctor to confirm and a suitable referred alternative suggestion was also provided to manage and overcome the identified MRP. Modified cases were updated daily until discharge and discharge summery was also collected. To continue this process of direct patient care through intercession approach **r**egular interaction with doctors was carried out regarding authentication of collected MRPs and development of a suitable management strategy was always the main motto. Finally collected cases were interpreted to extract the data according to various category and parameters to obtain the result.

RESULTS

During the study period we have confirmed a total of 70 cases according to inclusion and exclusion criteria. In those case definite MRP were established and subsequently suggested modifications to alter the therapy were accepted and modified accordingly. Demographic distribution (Table 1) of collected cases shows male and female were almost equal in number. In age wise distribution, we found that patient was present in almost all age groups, amongst them 16 – 41 years were predominant. We have also identified cases where patient age was between 1 month and less than 1 year (05) and 65 years and above (08). Admission department wise distribution highlights that, General medicine account for almost half of the collected cases, this predominately because general medicine department has highest number of bed strength in the hospital. Diagnosis wise distribution does not provide any specific condition for occurrence of MRP as a long list of 45 different diagnoses was identified in the collected cases (Table 2).

Table 1: Demographic distribution of collected cases.

Gender wise distribution of collected cases			
Sl No	**Sex**	**No of cases**	**Percentage (%)**
1	Female	36	51
2	Male	34	49
Age wise distribution of collected cases			
Sl No	**Age group**	**No of cases**	**Percentage (%)**
1	Up to 15 years	09	13
2	16 years – 40 years	31	44
3	41 years – 60 years	17	24
4	More than 60 years	13	19
Admission department wise distribution of collected cases			
Sl No	**Department**	**No of cases**	**Percentage (%)**
1	General Medicine	38	54
2	General Surgery	10	14
3	Pediatrics	08	11
4	Gynecology	07	10
5	Orthopedics	05	07
6	Gastroenterology	01	02
7	Psychiatry	01	02

Table 2: Diagnosis wise distribution of collected cases.

Diagnosis wise distribution of collected cases			
Sl No	**Diagnosis**	**No of cases**	**Percentage (%)**
1	Anemia	07	10
2	Fracture	05	07
3	Seizure	04	05
4	Dengue	03	04
5	Drug Induced Bleeding	03	04
6	Thrombocytopenia	03	04
7	Cirrhosis of Liver	02	
8	CVA	02	
9	Encephalopathy	02	Around 03% each
10	Fibroid Uterus	02	
11	Left LL Wet Gangrene	02	
12	LRTI	02	
13	Abnormal Uterine Bleeding	01	
14	Abusive Behavior	01	
15	Acute Appendicitis	01	
16	Acute Febrile Illness	01	
17	Acute Gastroenteritis	01	
18	Acute Liver Injury	01	
19	Acute Meningitis	01	
20	Alcohol Induced Cerebellitis	01	
21	B/L Pneumonitis with Sepsis	01	
22	Bicytopenia	01	
23	Cellulites	01	
24	Cerebral Sinus Venous Thrombosis with Abortion	01	
25	Cholelithiasis	01	
26	Chronic Kidney Disease	01	
27	Duodenal Ulcer	01	
28	DVT	01	Around 1.4% each
29	Drug Induced Extrapyrimidal Effects	01	
30	Ectopic Pregnancy	01	
31	Fistula	01	
32	Full term Vaginal Delivery	01	
33	Gastric Carcinoma	01	
34	Hypothyroidism	01	
35	Jaundice	01	
36	Left foot dry gangrene	01	
37	Liver Abscess	01	
38	Paracetamol poisoning	01	
39	Peripheral vascular disease	01	
40	Pneumatic effusion	01	
41	Post menopausal bleeding	01	
42	Pyrexia	01	
43	Sub Serosal Fibroid with Severe Anemia	01	
44	Thrombocytopenia with Fever	01	
45	Vaccine Induced Seizure	01	

Our study demonstrates 10 different types of MRPs developed in the confirmed cases. Drug toxicity, wrong dose, prescribing error and drug duplication was the most common MRP with almost 20% occurrence for each. Untreated indication, prescribing error with wrong dose and improper drug selection were next to follow. Administration error, drug without indication and drug-drug interaction was one each (Table 3).

From the study we identified the involvement various drugs in the reported MRPs. This data shows numerous drugs were involved into the development of MRPs and we had a total number of 46 different drugs out of all collected cases. Pantoprazole had the highest contribution followed by Ceftriaxone rest all drugs had almost single contribution. Upon pharmacological distribution of the involved drugs highlights that, antibiotics are the front runner (28%) to cause MRPs, followed by gastro protective agents (21%). Even supplements (8%) also found along with anticoagulants (7%) (Table 4).

For each collected MRPs we have provided standard and justified reference to establish our point and same was discussed with the visiting doctor. We have briefly described the individual identified MRPs and subsequent modification and/or suggestion provided to overcome the problems (Table 5).

DISCUSSION

Our study clearly highlights the necessity to include clinical pharmacist to identify MRPs and to resolve them before it causes patient Harm. Previously published reports also stated that, to keep away from any untoward medication related issues; suitable strategy need to exercise like inclusion of clinical pharmacist especially for pediatric and geriatric population patient group for proper prescription monitoring and subsequent modification before the drug is administered to avoid any additional healthcare burden.[8,9] Throughout the study, cases with definite MRPs have been collected from various departments. Furthermore, General Medicine being the largest department in terms of highest number of admission and also the bed capacity, we also found maximum cases from there only. Diagnosis wise distribution of collected cases shows a wide range of conditions with Anemia as the maximum number. But our study highlights that diagnosis has no direct association in the development of MRP.

In our study few cases were with two different types of MRPs occurred in a same case (Prescribing error with Wrong dose together) and therefore we have enlisted them as a separate MRP type. Condition such as Drug Toxicity, Prescribing Error, Wrong Dose and Drug Duplication were most common MRPs identified in our study. Drug Toxicity, Wrong Dose and Drug Duplication are such circumstances which may even

Table 3: Distribution of different types of MRPs.

Sl No	Types of MRPs	No of cases	%
1	Drug Toxicity	14	20
2	Wrong Dose	14	20
3	Prescribing Error	13	18
4	Drug Duplication	13	18
5	Untreated Indication	05	07
6	Prescribing Error with Wrong dose	04	05
7	Improper Drug Selection	04	05
8	Administration Error	01	Around 1.4% each
9	Drug without Indication	01	
10	Drug-Drug Interaction	01	

Table 4: Distribution of different drugs involved in MRPs.

Frequency of drugs involved in MRPs in individual case			
Sl No	Drug name	Frequency	%
1	Pantoprazole and Ranitidine	07	10
2	Ceftriaxone	05	07
3	Pantoprazole	05	07
4	Metronidazole	04	05
5	Sodium bicarbonate	03	04
6	Apixaban	02	Around 03% each
7	Cefotaxime	02	
8	Ondansetron	02	
9	Paracetamol	02	
10	Nicoumalone	01	Around 1.4% each
11	Alprazolam and Tramadol	01	
12	Ambroxyl	01	
13	Amikacin	01	
14	Amoxycillin with Cavunate	01	
15	Amoxycillin with Cavunate and Cefixim	01	
16	Aspirin and Atorvastatin	01	
17	Cefixim	01	
18	Carica Papaya	01	
19	Carbamazepine	01	
20	Cefotaxime and Ceftriaxone	01	
21	Ceftriaxone and Pipericillin with Tazobactum	01	
22	Doxycyclin	01	
23	Enalapril	01	
24	Furosemide	01	
25	Haloperidol	01	
26	Heparin	01	
27	Insulin	01	
28	Iron Folic Acid	01	
29	Multivitamin with Mineral	01	
30	Nifedipine	01	
31	Pantoprazole, Vitamin B complex and Furosemide	01	
32	Pentoxyphylin	01	
33	Phenytoin	01	
34	Pipericilin with Tazobactum	01	
35	Potassium chloride	01	
36	Ranitidine	01	
37	S-Adenosyl Methionine	01	
38	Sucralfate with Oxetacain	01	
39	Sodium valproate	01	
40	Thyroxin	01	
41	Tramadol	01	
42	Tranexamic acid	01	
43	Tramadol and Ondansetron	01	
44	Vancomycin	01	
45	Vitamin B12	01	
46	Warfarin	01	

Continued...

Table 4: Cont'd.

Distribution of involved drugs as per their Pharmacological class in MRPs			
Sl No	**Drug Class**	**Frequency**	**Percentage (%)**
1	Antibiotic(s)	20	28
2	Gastro Protective agents	15	21
3	Supplements	06	08
4	Anticoagulant	05	07
5	Antiepileptic	03	04
6	Antiemetic	03	04
7	Analgesic	03	04
8	Antacid	03	
9	Diuretic	02	Around 03% each
10	Anti Hypertensive	02	
11	Antipyretic	02	
12	Anti diabetic	01	
13	Antiplatelet	01	
14	Anti Schizophrenic	01	
15	Electrolyte	01	
16	Haemostatic	01	Around 1.4% each
17	Hormone	01	
18	Lipid lowering agent	01	
19	Mucolytic	01	
20	Natural product	01	
21	Sedative	01	

lead to serious patient harm.[10-12] Therefore our direct intercession to identify those issues, cross matched with standard reference, guidelines and succeeding modification suggestion were a timely action as a direct patient care approach. For all these cases, scrutiny and discussion with doctor were fruitful as they accepted our suggestions and alter the medication accordingly. This has greatly enhanced the therapeutic outcome of the patient with minimizing further complications. Importance of inclusion of pharmacist led intervention has proven efficacy in terms of patient benefit and also to reduce medication error.[13,14] Prescribing Errors were mainly due to writing mistake and mostly double writing of same medicine, those are not much of hazardous as the nurses administer only one even if written as two times. But as per our identification we have thoroughly scrutinize them and as well discussed with doctor for withdrawal of one from the prescription.

But if we investigate the drug classification, whole scenario changes dramatically and we found that antibiotics are the drugs that appeared to develop maximum number of MRPs being one of the most talked global healthcare issues.[15] followed by gastro protective agents. Supplements and anticoagulant are the other two classes which are in forefront to develop MRPs. Similar finding was also reported previously.[16] This finding clearly shows that antibiotics still remain a matter of concern while prescribing and a strong vigilant analysis of every antibiotic prescribed should be one of the keys focuses of every clinical pharmacist while reviewing the patient case sheet. By performing the direct approach to manage those MRPs, we strongly believe that we have achieved our targeted goal to enhance patient care.

In the management approach towards identified MRPs, we have thoroughly discussed with the doctors for every single identified MRP and also provided supportive evidence and justified information support obtained from either textbook or from standard medical journal/websites. With our vigorous approach individual medication related problems were accepted and our service was appreciated. This intercession activities by clinical pharmacist shows a positive outcome even on the doctors also, they are well aware about various medication related problems but due to their time constrain and huge patient burden especially in a government hospital setup, made them restricted to focus in this particular arena. Support by clinical pharmacist in this particular pitch has provided them an opportunity to rectify their prescription error as they also have the motto to provide better patient care. As both of our aim matched, we could enhance the overall management approach together.

We also found certain cases in which rectification was not done on the patient case sheet even though after discussion MRPs were accepted. The main reason for this was identified as: As prescribed by the unit chief/ Senior professor, therefore Post Graduate Trainees were not able to modify those without prior permission and thus it may take some additional time to alter, non-availability of drugs in the unit, doctors were not adequately confident about clinical pharmacist's intercession suggestion to alter a drug therapy or doctors may have diverse or improved verdict about a reported MRP. We did not include those cases for our study; instead, we have continued our dialogue with the doctors and provided them additional information about those MRPs to establish our position so as to continue the approach for future development. This study was performed in a government hospital setup with various limitations. However, since the reduction of prescribing errors and related harm was significant in this study, and the results corresponded to earlier findings, it is highly probable that the beneficial effects could be copied in other clinical settings by the on-ward employment of clinical pharmacists.

CONCLUSION

Clinical pharmacists are uniquely trained to review prescription medicine and also to intercession with a main axiom as better patient care. From this study we highlighted that certain medication related problems are frequently came into sight and those needs to be addressed with proper management strategy. Our study further highlights about necessitate of clinical pharmacist intercession in optimizing drug therapy by providing proper medication information and same has been accepted and appreciated by various doctors. We could conclude that direct intercession approach by clinical pharmacist has great outcome to manage MRPs for enhanced patient care.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

CABG: Coronary Artery Bypass Graphting; **Tab:** Tablet; **PT:** Prothrombin time; **INR:** International Normalized Ratio; **mg:** Milligram; **SJS:** Steven Johnson Syndrome; **SOS:** Whenever Necessary; **GRBS:** Generalized Random Blood Sugar; **dl:** Deciliter; **TID:** Trice In a Day; **DNS:** Dextrose Normal Saline; **gm:** Gram; **Inj:** Injection; **OD:** Once in a Day; **BD:**

Table 5: Distribution of different types of identified MRPs and their individual description.

Type of MRP	Description of MRP	Suggestion and/or Modification
Administration Error	Due to improper administration of Thyroxin condition of the patient got worsened. Even though dose was correctly prescribed, patient took it wrongly.	The dose of Thyroxin was described to the patient and observed to make sure patient took it correctly.
Drug Toxicity	Paracetamol induced itching	Paracetamol was suggested to hold, and following which complication subsided.
	Tramadol induced vomiting.	Tramadol was suggested to hold and alternatively Diclofenac was suggested. Patient condition improved simultaneously.
	Patient is known case of coronary artery disease with CABG and aortic valve replacement procedure, upon administration of Acitrom (Nicoumalone) patient developed bleeding per rectum.	Suggested to hold Actinorm. Further Vitamin- K with and Tranexamic acid were suggested to control the bleeding. Acitrom was kept on hold until discharge, and prescribed with Acitrom 1mg while discharge with proper counseling.
	Due to the usage of Apxiaban, patient developed haemoptysis and bleeding from nose.	Suggested to hold Apxiaban. Further Vitamin- K with and Tranexamic acid were suggested to control the bleeding. Based on the condition oral anti coagulants Dabigatran 150mg was suggested on discharge.
	Administration of Phenytoin caused venous irritation and patient developed thrombophlebitis.	Phenytoin was suggested to hold so as to minimize the complications, once condition subsided the drug was reintroduced with careful monitoring and further no untoward effect developed.
	Administration of Haloperidol leads to development of extra pyramidal symptoms and muscular dystonia.	Patient was advised to stop administration of Tab. Haloperidol and alternate drug Risperidone was suggested.
	In this case patient was prescribed Inj. Metronidazole for post surgical treatment of appendicectomy and developed loose stools.	Metronidazole was suggested to withdraw and two other antibiotics were prescribed.
	Apxiaban induced bleeding manifestation.	Suggested to hold Apxiaban until PT/INR report. Further Tranexamic acid 500mg was suggested to control bleeding and Dabigatran 110mg was prescribed as an alternative to Apxiaban.
	Vancomycin induced skin rash	Vancomycin was asked to hold and addition of Chlorpheniramine Maleate was added to control the situation.
	Heparin induced skin rash	Heparin was stopped and Chlorpheniramine Maleate along with Hydrocortisone was suggested to manage the condition. Once condition was stabilized Heparin was reintroduce with close monitoring.
	Ceftriaxone induced skin rash	Ceftriaxone was stopped and Calamine lotion was added to reduce the complication. Further non beta lactum antibiotic was suggested.
	Ceftriaxone induced skin rash	Ceftriaxone was suggested to stop and condition subsided after withdrawal of drug. Further non beta lactum antibiotic was suggested.
	Iron folic acid induced skin rash	Upon discussion with the doctor Iron folic acid was stopped and patient complication subsided.
	Carbamazepine induced skin rash and suspected SJS	Upon discussion Carbamazepine was stopped, skin rash was managed with symptomatic care.
Drug – Drug Interaction	Co administration of Tramadol and Ondansetron leads to fever spike and vomiting.	Tramadol was suggested to withdraw and alternatively Diclofenac was added, and oral Paracetamol was prescribed as SOS.

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	There were 07 cases where both Pantoprazole and ranitidine was prescribed in a same day prescription. In these cases patient was prescribed with more than one medicine from the same category or therapeutic class to treat same condition.	For all the cases discussion was done with the doctor and informed that, maximum number of medicines in the acid suppressants agents' category to be taken concurrently is one as per the recommendation. Subsequently all those prescriptions were modified by keeping only and withdrawing the other. In most of the cases doctor continued with Pantoprazole.
	In a same day prescription both Sodium bicarbonate and another as brand name Nodosis (sodium bicarbonate) were prescribed.	Upon identifying the same and subsequent discussion Sodium bicarbonate was stopped and Nodosis was continued.
Drug Duplication	Both Cefotaxime and Pipericilin with Tazobactum from beta lactum antibiotic group prescribed in a single prescription.	As the recommended maximum number of antibiotic from same group is one, therefore same was discussed and Cefotaxime was withdrawn and Pipericilin with Tazobactum was continued.
	$NaHCO_3$ prescribed two times in a single day prescription both as oral and parenteral.	Upon discussion oral $NaHCO_3$ was continued and parenteral was discontinued.
	Two beta lactum antibiotics; Amoxicillin with Clavunate and Cefotaxime were prescribed in a same day prescription.	Upon discussion Amoxicillin with Clavunate was withdrawn and Cefotaxime was changed to Ceftriaxone for enhanced outcome.
	Ceftriaxone and Pipericilin with Tazobactum was prescribed (both beta lactum antibiotic) in a same day prescription along with Metronidazole.	Same was discussed and modified as continuing only Pipericilin with Tazobactum and withdraw Ceftriaxone
	Two beta lactum antibiotics; Ceftriaxone and Cefotaxime were prescribed in a same day prescription. Moreover both from the same class of Cephalosporin antibiotics	Same was discussed and modified as continuing only Ceftriaxone and withdrawal of Cefotaxime.
Drug without Indication	Insulin was prescribed even though the patient was non-diabetic (GRBS-102mg/dl).	Past medical history of patient revealed non-diabetic and same was discussed with the doctor along with sugar test report and subsequently Insulin was withdrawn.
	Thrombocytopenia patient was prescribed with Pantoprazole.	Pantoprazole leads to decrease in platelet count due to immune mediated destruction of platelets and direct toxic effect on haemopoietic cells. Hence it is not preferred in patient with thrombocytopenia. Upon discussion Pantoprazole was withdrawn and Ranitidine 150mg was suggested.
Improper Drug Selection	In this case patient's serology report shows presence of Klebsiella species and it is resistance to available 3_{rd} generation cephalosporin and sensitive to Amikacin. But the patient was prescribed with Cefotaxime.	Upon discussion with doctor with the serology report and reference, Amikacin 500mg TID was added in the prescription and Cefotaxime was withdrawn.
	Diabetic patient was prescribed with 1 amp of MeAxon plus (Multivitamin with Mineral) in DNS	Upon discussion MeAxon plus was suggested to dilute in Normal saline avoiding DNS.
	In a known case of Thrombocytopenia Ceftriaxone was prescribed.	The same was discussed and alternative antibiotic Inj. Amoxicillin with Clavunate 1.2gm twice a day was suggested and same was prescribed.
	In 02 cases Metronidazole was prescribed as both oral and parenteral 400mg TID for a same day prescription.	It was brought to the notice of the doctor and suggested to continue with any one formulation and discontinued the other one.
	Patient was co-administered with Restyl (Alprazolam) and Tramadol and it leads to development of respiratory distress which was characterized by shortness of breath.	This issue was brought to notice of the doctor with reference support. Further suggested to withdraw Tramadol with alternative suggestion Diclofenac was prescribed. Patient condition improved subsequently.
	Patient was prescribed Inj. Tranexamic acid 500gm.	The dose was written as very high than recommended, it was informed and corrected to Inj. Tranexamic acid 500mg BD.
Prescribing Error	Vitamin B12 prescribed two times in a single day prescription	Upon discussion it was modified to one time only.
	Pantoprazole prescribed two times in a single day prescription.	Upon discussion it was modified to one time only.
	Paracetamol was prescribed as both oral and parenteral on a single day prescription.	Upon discussion Parenteral Paracetamol was stopped and oral continued.
	Amoxicillin with Clavunate was prescribed both oral and parenteral in a single day prescription	Upon discussion oral Amoxicillin was stopped and parenteral continued.
	Pentoxifylin (Trental) mistakenly prescribed as Tramadol	Correction was done by writing the drug Trental.
	Both Pantoprazole Tablet and Injection 40mg OD was prescribed in a same day prescription	Oral form was discontinued keeping only the parenteral.
	Ceftriaxone 1gm BD was prescribed TWO times in a single day prescription	Same was identified and discussed to modify as 1gm BD only.
	Inj. Ranitidine 100mg BD was prescribed two times in a same day prescription	Upon discussion only 100mg BD was continued withdrwaing the other one.
	Tab. Enam (Enalapril) was mistakenly written as Bnam.	Upon discussion with PGT it was correctly written as Enam.

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	The usual dose of Syp. Sodium valproate is 2ml (5ml=200mg) but it was prescribed as 20ml twice daily.	The error was noticed and upon discussion it was rectified as 2ml BD.
Prescribing Error with Wrong dose	In this case Inj. Pantoprazole 40mg IV OD and Inj. Optineuron (Vitamin B-complex) was prescribed two times in a single day prescription. Further Inj. Furosemide was prescribed as 20mg IV BD and 1gm IV BD	After identifying the errors, it was brought to the notice of the doctor and discussion was done about Furosemide dose. Subsequently all three errors were modified as only once for Pantoprazole and Optinuron. Furosemide was continued with 20mg IV BD withdrawing 1gm dose.
	Usual dose of Inj. Pantoprazole is 40mg, but it was prescribed as Inj. Pantoprazole 400mg	The dose was corrected and changed to Inj. Pantoprazole 40mg OD.
	Aspirin was prescribed as 150gm and Atorvastatin was prescribed as 80gm.	Both the drugs were prescribed in a wrongly manner with much higher dose. Subsequently it was modified as Aspirin 150mg OD and Atorvastatin 80mg OD.
	Patient had complaints of cough but no cough syrup was prescribed.	Mucolytic agents Syp. Ambroxol was suggested and the same was prescribed next day.
	A low level of potassium was found in the blood test report but was not treated.	Syp. Potchlor (Potassium Chloride) was suggested based on the blood report and the same were prescribed.
Untreated Indication	Patient had complaints of edema but was left untreated.	Upon discussion about the complain of the patient, Inj. Furosemide 40mg was added to treat edema and condition was subsided
	No treatment was initiated for burning micturation complication.	Upon discussion about complain of the patient Syp. Citralka (Di Sodium Hydrogen Citrate) was added in the prescription
	Hypokalemia was not treated.	Upon discussion about complain of the patient Syp. Potchlor (Potassium Chloride) was added in the prescription
	Sucral-O (Sucralfate with Oxetacain) was prescribed as 5ml 5times a day.	The usual adult dose of Sucral-O is 1gm orally 4 times a day in duodenal ulcer. Subsequent discussion about dose it was as corrected and prescribed as 5ml 4times a day.
	Tab. Cefotaxime was prescribed 1gm twice a day, where the usual dose of Tab. Cefotaxime is 200mg.	The dose of Tab. Cefotaxime was corrected and changed as Tab. Taxim 200mg
	Maximum dose of Nicardia retard (Nifedipine) is 10mg, but was prescribed as Tab, Nicardia retard 100mg.	The dose was reduced to Tab. Nicardia retard 10mg and error was rectified.
	Pipericilin with Tazobactum was prescribed much higher than the recommended pediatric dose.	Dose was calculated and reduced as per the Pediatrics dose
	Ondansetron was not prescribed as per body weight	Dose was calculated and reduced as per the Pediatrics dose
	Nusam (S-Adenosyl Methionine) was prescribed higher than the recommended dose	Dose was calculated and reduced as per the recommendation.
Wrong Dose	Tablet Caripill (Carica Papaya) was prescribed as 110mg	Actual dose of Caripill is 1100mg, same was discussed and corrected.
	Cefotaxime was prescribed as 4.2gm BD	Dose is way over recommended dose same was discussed and modified to 1gm BD.
	In a case of CSVT Warfarin was prescribed with 20mg OD on day 5	Recommended Warfarin dose in CSVT is 2-5mg OD. Upon discussion dose was modified to 2mg OD.
	Ceftriaxone was prescribed as 4gm IV BD.	Upon discussion dose was modified to 1gm IV BD.
	Metronidazole was prescribed as 1gm IV TID and Ceftriaxone as 500mg IV BD	Upon discussion with reference about dose, the drugs were prescribed correctly as Ceftriaxone 1gm IV BD and Metronidazole 500mg BD
	Doxycycline was prescribed as 500mg BD	maximum daily dose of Doxycycline should not exceed 200mg per day, same was discussed and modified as 100mg BD.
	Tablet Pantoprazole 40mg OD and injection Pantoprazole 40mg BD prescribed in a single day prescription	Discussed to add either 40mg OD or 40mg BD, as the prescribed dose is higher than the recommended dose.
	Metronidazole was prescribed as 100mg.	Upon discussion dose was modified to Metronidazole 400mg.

Twice in a Day; **TID:** Thrice in a Day; **PGT:** Post Graduate Trainee; **Syp:** Syrup; **ml,** Milliliter; **IV,** Intravenous; **CSVT,** Cerebral Venous Sinus Thrombosis.

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