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"An approach of clinical pharmacist in minimising length of hospital stay of patients and rational use of antimicrobials"

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ABSTRACT

Irrational drug therapy remains a global phenomenon. The mean number of drugs per prescription should be as low as possible since higher figure always leads to increased risk of drug interaction, development of bacterial resistance, affect patient compliance and increases costs. The aim of present study is to reduce patient stay in inpatient setting. This may be studied by involving the factor like Drug interaction, Percentage of amount spent on anti-microbial (cost of therapy). This study will help for promoting the rational use of antimicrobials along with the reduction in hospital stay of the patient. The study was done in three wards of pediatric of MMIMSR.200 cases of anemia and 100 cases of UTI were collected during the pre intervention and post intervention studies.P1 was placed as a control while wards. P2 and P3 were placed as tests during the adherence study. The percentage of anemic patient at the time of admission in both the categories was severe 30% and mild to moderate was 70% during pre intervention but in post intervention it was found 22% and 82% respectively. 72% patient having mild to moderate anemia in pre intervention study. While it was 82.88% in post intervention studies. It is clear that the maximum percentages of the patient are those suffering from mild to moderate anemia. Patients when they were classified on the basis of associated infection it was found that 3.33% and 31.88% had infection during pre-Intervention and Post-Intervention studies. While for mild to moderate it was found 85.70% and 85.36% in pre-Intervention and Post-Intervention studies respectively.

Keywords: Preintervention, Postintervention, Drug-interaction, Rational use, Hospital stay, Cost of therapy, Associated infection, Anaemic

INTRODUCTION

Irrational drug therapy remains a global phenomenon. (J.S. Bapna. D.G. Shewade and S.C Pradhan, 1994).The mean number of drugs per prescription should be as low as possible since higher figure always leads to increased risk of drug interaction, development of bacterial resistance, affect patient compliance and increases costs. This study indicated general trends in prescribing. The mean drugs per prescription of hospitalized patient (6.04) was below the figure of 9.4 reported from U.S. and higher than those reported from Scotland 4.5, South Africa 4.3, Sweden 5.1 and Nepal. (H.S.REHANA, M.A.Nagarani and Moushumi

Rehan, 1998) 5.1. Community-based out-patient care in India showed 2-3 drugs per patient as per study conducted in Bangalore, correlating with this study (3.29). [1-5]

Main cause of over prescribing is the pressure put on the doctor to do 'something positive' for the patient. The second factor is the apprehension of missing an underlying disease. Third reason is that the patient expects medications as some kind of a social right. [6-10]

The aim of generic prescribing is to reduce consumer costs through substitution of less expensive formulation for brand name prescribed drugs. Incomes of most of the people attending the clinics are either low or medium. So there is a clear need to relieve financial burden of medical care from person with fixed income.

Some patients do not like to visit the doctor on Tuesday and Fridays, which they consider inauspicious. Injection culture has engulfed our society. For every injection the prescriber should strike a balance between the medical need on one hand and the risk of side effects, inconvenience and cost of the other. [11-16]

In fact, pharmacist/doctor must advise the patient about the necessity of continuation of the antibiotic therapy even though the patient may feel better. Two out patients received chloroquine without any bacteriological investigation. Pyrexia of unknown origin and upper respiratory tract infection were treated with broad spectrum antibiotics. Several patients were found to receive antimicrobials post operatively until their discharge from the hospital or for a period of 15 days. These were against the guidelines (S.C Pradhan, D.G Shewade, Uma Tekur, D.Pachiappan, A.KDey, C.Adithan, C.H Shashindran and J.S Bapna, 1990) of antibiotic use. Indiscriminate use of cephalosporins in hospitals made the prescription costlier, which in turn may lead to discontinuation of therapy by people with low income. [17-20]

Third generation cephalosporins, quinolones and vancomycin should be conserved to reduce the risk of resistance. Few incidents of drug duplication were observed. It can be mainly attributed to (1) physician's ignorance about the drug components (2) Administration of drugs containing the same components in different dosage form. This can be controlled, if physicians have a thorough knowledge about the drugs which they prescribe.

AIM OF THE STUDY

The aim of present study is to reduce patient stay in inpatient setting. This may be studied by involving the factor like Drug interaction, Percentage of amount spent on anti-microbial (cost of therapy). This study will help for promoting the rational use of antimicrobials along with the reduction in hospital stay of the patient.

MATERIAL AND METHODS

The study was done in three wards of pediatric of MMIMSR.200 cases of anemia and 100 cases of UTI were collected during the pre intervention and post intervention studies.P1 was placed as a control while wards P2 and P3 were placed as tests during the adherence study. [21-30]

This was a prospective randomized controlled study and included all patients with severe and mild to moderate anemia. For urinary infections patients with all age group were included. The epidemiological data of all the diseases, which are the common causes of morbidity in pediatric was collected from the admission register and the common diseases were identified. [31-35]

A data collection form was designed for the required data and the data was collected from clinical case sheets. These data include name, age, sex, and body weight, in patient number, date of admission, date of discharge, reason for admission, clinical symptoms, lab data, provisional diagnosis and detail of therapeutic management. The pooled data analyzed after considering expert opinion of the clinicians. The prescription of anemia were analyzed to find out the percentage of patients coming under sever and mild to moderate, the duration of hospital stay (In days), percentage patients associated with infection, percentage of patients received antimicrobials, average number of drugs prescribed per patient per day, average cost of therapy, percentage amount spent on antimicrobials, were analyzed for urinary tract infection the parameter were used are percentage of the patients received antimicrobials, percentage of patients received injections, percentage of patients received urine culture report, percentage of drug prescribed from essential drug list Haryana Government, etc. The treatment pattern was compared with that given in the standard references

and also in the various standard treatment protocols which are as follow: [36-40]

Delhi Society for the promotion of rational use of drug, integrated management of childhood illness (IMCI), World Health Organization, Pediatric Pharmacopoeia. The pooled information is discussed with the doctors, individually and also in groups and the most acceptable treatment is selected to develop a standard treatment protocol.

Assessment of prescriptions (in-patient) [41-50]

100 in-patients cases were collected, 50 each from each of the two wards of medicine. The qualifications of all the prescribers were MD/MS or above. Follow up of the drug therapy of clinical cases were made from the day of admission to the day of discharge. Patient's case records were examined for details of prescription, to fill the Performa. For any clarification required, patient and the doctor on duty was interviewed.

Assessment of prescriptions (out-patient)

The consumption of drugs has steeply increased all over the world, though differences exist between countries, and within the same country. Keeping in view all these concept ad as well as the socio-economic condition of the outpatient who are from nearby area of mullana i.e. Yamunanagar, Jagadari, Shahranpur etc. Seventy (70) outpatients prescription were collected from two general practioners from the OPD of MMIMSR.

At the time of collection of the data in the form of prescription, the prescription was collected from outpatient ward while the doctors were also present with the patient. The patients as well as the prescriber both were also interviewed and later on data were collected in prepared Performa.

MANAGEMENT OF POSSIBLE DRUG INTERACTIONS [51-53]

DJ Quinin and R.O Day. Clinically important drug interactions, 1997, Lvan. H. Stockley Drug Interactions 2nd edition 1991, Philip. D. Hansten: Drsginteractions. 4th edition 1979, Arshia Shariff and Sarasija Suresh. Antibiotic incompatibility, (1996).

Frusemide –digoxin

When these drugs are administered together, Hypokalemia may result. Hypokalemia can be managed properly with the administration of potassium supplements Else, monitor the therapy or use a potassium-sparing diuretic such as spironolactone or triamterene.

Amikacin –frusemide

Both the drugs are associated with ototoxicity and nephrotoxicity. If concurrent use is inevitable, monitor for any evidence of change in serum levels of amikacin and ear or kidney damage.

Enlapril –frusemide

Although ACE inhibitors can maintain body potassium, their concurrent use can result in hypokalemia. Potassium supplements can be given. Regular monitoring of serum K^+ level is essential if congestive heart failure is treated with ACE inhibitor and K^+ loosing diuretics.

Alprazolam –digoxin

A high risk of toxicity is observed with increased plasma digoxin concentration in the elderly. If possible avoid this combination by using alternative benzodiazepines. If not, monitor plasma digoxin concentrations and the patient's clinical status.

Carbamazipine-haloperidol

Serum level of haloperiodol can be reduced to about 50% by concurrent use of carbamazepine. Neutrotoxicity during concurrent use is also found. Carbamazepine induces the metabolism of haloperidol. So concurrent use should be well monitored for any signs of reduced haloperidol effects and be alert for any signs of neurotoxicity.

Heparin-aspirin

Aspirin in doses of 500 mg/day increases the bleeding 3-5 times in those taking anticoagulants. Aspirin has a direct irritant effect on the stomach and can cause gastrointestinal bleeding. Low dose aspirin (75 mg) daily does not cause much problem. Safer analgesics have to be substituted.

Aspirin – insulin

Aspirin lowers blood sugar level. The blood sugar lowering effect of this combination is additive. So readjustment in the dose of

hypoglycemic agent may be appropriate if large doses of salicylates are used.

Ciprofloxacin – theophylline

Serum levels of theophylline can be increased (two-three fold) by concurrent use of ciprofloxacin. Ciprofloxacin inhibits the metabolism of theophylline. Avoid concurrent use or monitor the serum levels of theophylline Lomefloxacin appears not to interact with theophylline.

Ampicillin – chloramphenicol

Chloramphenicol is bacteriostatic and ampicillin is bactericidal. ampicillin will act only on dividing cells. Chloramphenicol will render the ampicillin action ineffective.

Paracetamol – chloramphenicol

Half-life of chloramphenicol is prolonged by paracetamol by decreased elimination of the former. But this is a common combination for enteric fever. Monitor serum chloramphenicol levels closely for agranulocytosis.

Carbamazepine – glibenclamide

The diuretic effect of glibenclamide is opposed by carbamazepine. It is better to avoid the concurrent use of these drugs with antagonistic action.

Antacids – ciprofloxacin

Serum ciprofloxacin levels can be reduced below therapeutic concentrations by the concurrent use of aluminium and magnesium antacids. Antibotics form insoluble chelates with aluminium and magnesium ions in the gut which reduces the absorption. Both these drugs should be administered with an interval of atleast 4 hours.

Plan of work

This study was carried out in three wards of pediatric department of MMIMSR, a tertiary care multi specialty teaching hospital in Mullana. The work plan was made in consultation with clinician of the pediatric department to fulfill the objective criteria. For the present study anaemia, UTI was selected in pediatric along with the study of polypharmacy, drug interaction and rational use of antimicrobials for out patients and inpatients setting. The work plan included

- Collection of epidemiological data of the common diseases in pediatric and outpatient as well as in patient setting.
- Designing a data collection form.
- Collection of data from clinical data sheets.
- Analysis of treatment given by the clinician for each disease.
- The enquiry of the individual clinician in treating each disease condition.
- Comparision of treatment plan with reference standard clinical guideline.
- Dissemination of pooled information with doctors individually and in group for developing and acceptable treatment protocol.
- A study was conducted to monitor the clinician adherence to standard treatment guideline in promoting rational prescribing.
- For the purpose of outpatient prescription study was conducted at different health care facilities, in the same period to avoid seasonal variations. Only drugs or modern medicine were included in the study (H.S.REHANA, M.A.Nagarani and Moushumi Rehan, 1998). (Intravenous fluids and transfusions were not counted as drugs. Each drug was counted once per patient, irrespective of change in dose, route of administration and combination drug were counted as one, in evaluation of drug use indicators. (H.S.REHANA, M.A.Nagarani and Moushumi Rehan, 1998) Proformas collected were subjected to analysis, and compared under the following headings:-
- In-patient and outpatient prescriptions from MMIMSR Mullana.
- The parameters for evaluation:

DRUG USE INDICATORS [54-57]

Prescribing indicators

Incidence of polypharmacy, Utilization of essential drugs list, Incidence of antimicrobial agent use, Distribution of AMA among different chemical class.

Health facility indicators

In order to find out health facility indicators following questions were asked at each health facility under study.

1. Does the facility have its own essential drugs list or formulary?

2. Whether the facility is using any WHO or National essential drug list?
3. Whether all the key drugs are available at the health facility?

EVALUATION OF RATIONALITY [58-61]

Drug-drug interaction

Whether any clinically significant, drug-drug interactions were present among the prescribed drugs?

Analyses of prescriptions were manually performed. Data from the proforma were further analysed using various analysis sheets (appendix 2 to 6).

Following references were utilized for the evaluation of rationality of prescription. (Hospital Formulary. Medical College Hospital, Trivandrum 1997, Indian drug review (IDR) March /April 1999, DJ Quinin and R.O Day. Clinically important drug interactions, 1997, Lvan. H. Stockley Drug Interactions 2nd edition 1991, Philip. D. Hansten: Drsginteractions. 4th edition 1979, Daniel A Hussar.

METHODOLOGY

Setting

The study was done in three wards of pediatric of MMIMSR. 200 cases of anemia and 100 cases of UTI were collected during the pre intervention and post intervention studies. P1 was placed as a control while wards P2 and P3 were placed as tests during the adherence study.

Design

This was a prospective randomized controlled study and included all patients with severe and mild to moderate anemia. For urinary infections patients with all age group were included.

Collection of epidemiological data

The epidemiological data of all the diseases, which are the common causes of morbidity in pediatric was collected from the admission register and the common diseases were identified.

Designing a data collection form

A data collection form was designed for the required data and the data was collected from clinical case sheets. These data include name, age, sex, body weight, in patient number, date of admission, date of discharge, reason for admission, clinical symptoms, lab data, provisional diagnosis and detail of therapeutic management.

Analysis of pooled data

The pooled data analyzed after considering expert opinion of the clinicians. The prescription of anemia were analyzed to find out the percentage of patients coming under sever and mild to moderate, the duration of hospital stay (In days), percentage patients associated with infection, percentage of patients received antimicrobials, average number of drugs prescribed per patient per day, average cost of therapy, percentage amount spent on antimicrobials, were analyzed for urinary tract infection the parameter were used are percentage of the patients received antimicrobials, percentage of patients received injections, percentage of patients received urine culture report, percentage of drug prescribed from essential drug list Haryana Government, etc.

Comparison of treatment pattern with standard references

The treatment pattern was compared with that given in the standard references and also in the various standard treatment protocols which are as follow: Delhi Society for the promotion of rational use of drug, integrated management of childhood illness (IMCI), World Health Organization, Pediatric Pharmacopoeia.

Intervention

The pooled information is discussed with the doctors, individually and also in groups and the most acceptable treatment is selected to develop a standard treament protocol.

Adherence study

A study is conducted to monitor the clinician's adherence to standard treatment guidelines by making use of all the parameters used earlier. The study for the rationality of outpatient prescription and rationality study for two main complication i.e. anemia and urinary tract infection in pediatric in inpatients setting was carried out from May 2014 to September 2015 by collecting details of prescriptions to fill the proforma.

Proforma contain following format

Patient's details, Social history, Family history of illness, Previous history of drug interaction, allergies or severe ADR, Past medical history, Signs and symptoms or complaints for which consultation saught, Investigatons, Diagnosis, Medication therapy (As entered in prescription), Instruction for diet, Average cost of prescription drugs/day, Discharge advice and Any other remarks.Study was devided into two following parts;

Assessment of prescriptions (in-patient)

100 in-patients cases were collected, 50 each from each of the two wards of medicine. The qualifications of all the prescribers were MD/MS or above. Follow up of the drug therapy of clinical cases were made from the day of admission to the day of discharge. Patients case records were examined for details of prescription, to fill the proforma. For any clarification required, patient and the doctor on duty was interviewed.

Assessment of prescriptions (out-patient)

The consumption of drugs has steeply increased all over the world, though differences exist between countries, and within the same country. Keeping in view all these concept ad as well as the socio-economic condition of the outpatient who are from nearby area of mullana i.e. yamunanagar, jagadari, shahranpur etc. 70 out patients prescription were collected from two general practioners from the OPD of MMIMSR.

At the time of collection of the data in the form of prescription, the prescription were collected from outpatient ward while the doctor were also present with the patient.the patient as well as the prescriber both were also interviewed and later on data were collected in prepared performa.

Table – 1 Percentage of anemic patient at the time of admission

Category	Pre Intervention	Post Intervention
Severe	30	22
Mild to Moderate	70	82

The percentage of anemic patient at the time of admission in both the categories was severe 30% and mild to moderate was 70% during pre intervention but in post intervention it was found 22% and 82% respectively. 72% patient having mild to moderate anemia in pre intervention study. While it was 82.88% in post intervention studies. It is clear that the maximum percentages of the patient are those suffering from mild to moderate anemia.
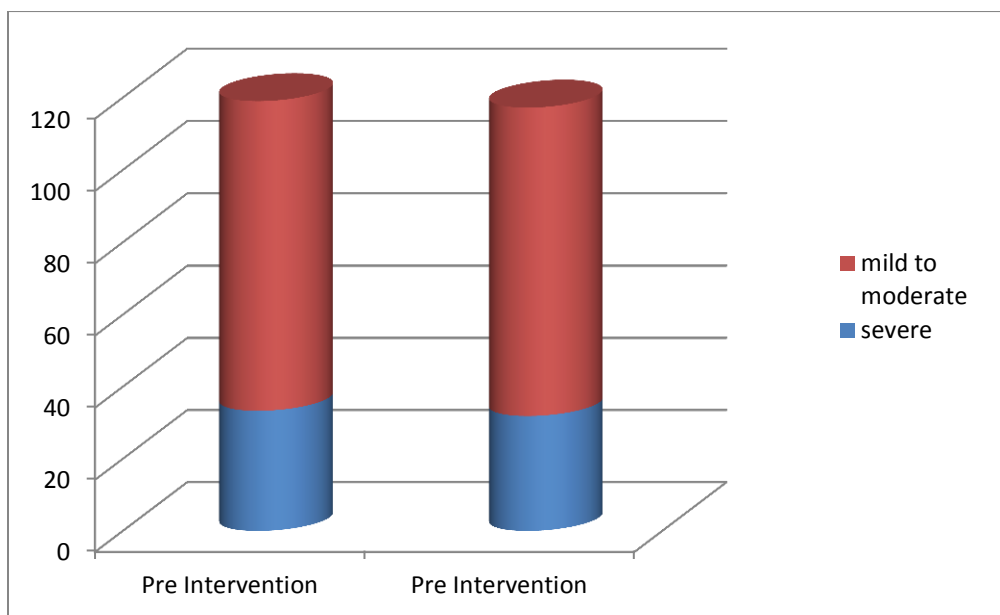

Fig-1- Percentage of anemic patient at the time of admission

Table – 2 Classification of patient on the basis of associated infection

	Pre Intervention	Post Intervention
Severe	33.33	31.88
Mild to Moderate	85.7	85.36

Patients when they were classified on the basis of associated infection it was found that 3.33% and 31.88% had infection during pre-Intervention and Post-Intervention studies. While for mild to moderate it was found 85.70% and 85.36% in pre-Intervention and Post-Intervention studies respectively.
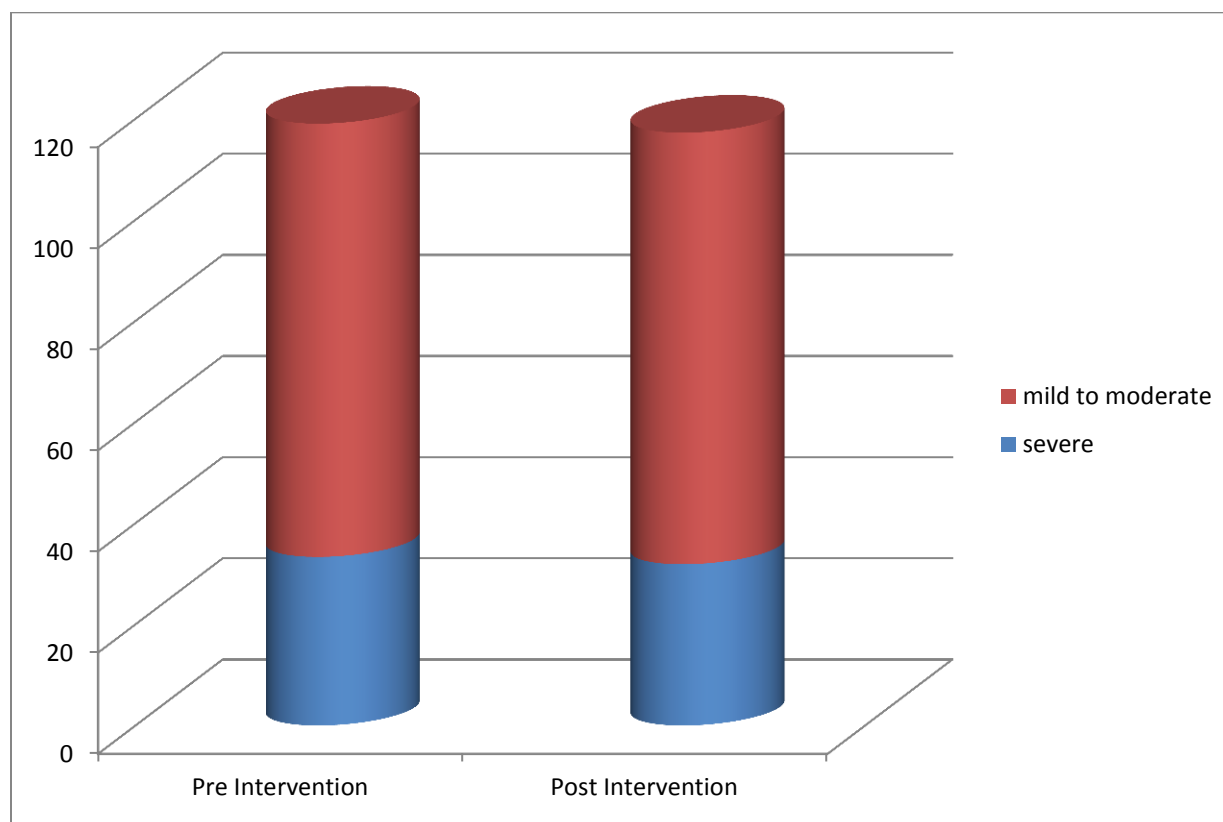
Fig-2- Percentage of patients on the basis of associated infection

Table – 3 Duration of hospital stay

Category	Pre Intervention	Post Intervention
Severe	14	16
Mild to Moderate	8	6

The duration of Hospital stay was found short in case of mild to moderate anemic patients during pre-intervention and Post-Intervention studies. But in case of severely anemic patients the length of hospital stay has increased by two days during pre-intervention and Post-intervention studies.
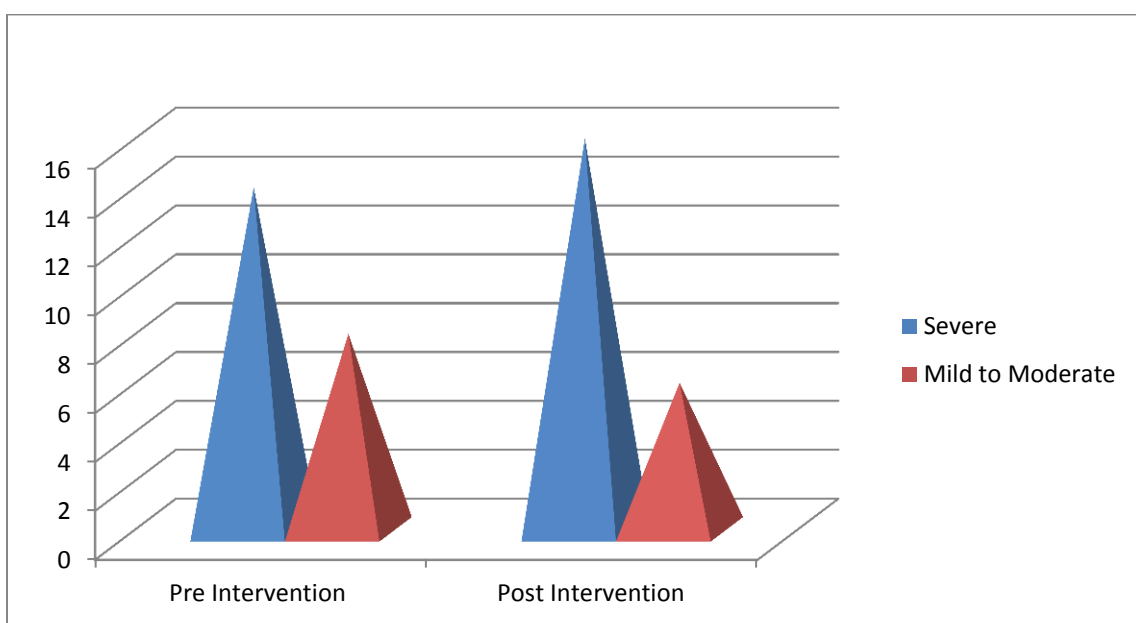
Fig-3- Comparision of average length of hospital stay based on infection during pre-intervention and post-interventions studies

Table – 4 Percentage amount spent on antimicrobials

Category	Pre Intervention	Post Intervention
Severe	44	42
Mild to Moderate	52	49

In the study of cost of therapy it was found that the most portion of the cost of therapy is the amount is spent on antimicrobials but in post-intervention study it was reduced in the patients associated with infection.
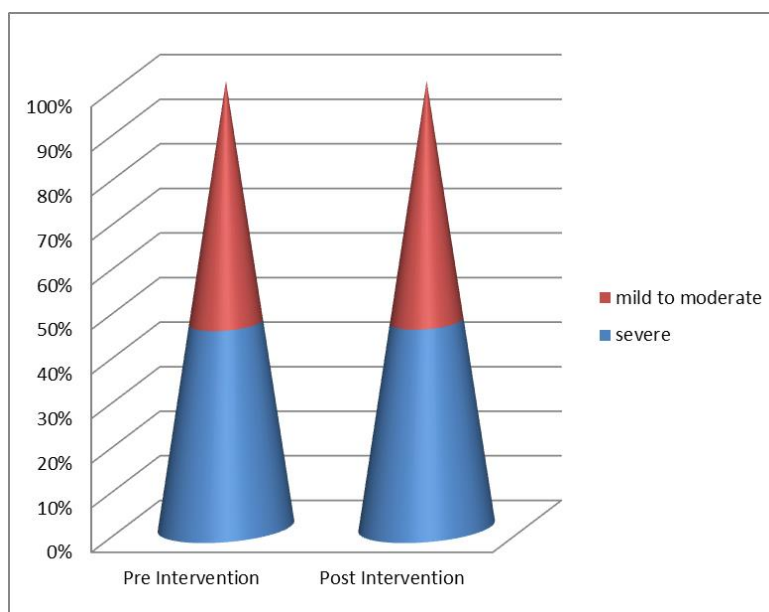

Fig-4- Comparision of the percentage amount spent on antimicrobials during the preintervention and post intervention studies

Table – 5 Cost of therapy

Category	Pre Intervention	Post Intervention
Severe	686	784
Mild to Moderate	256	192

In case of severely anemic patient the cost of therapy was found more than to mild to moderate category after intervention the cost of the therapy for the mild to moderate category has decreased because of decrease in duration of hospital stay.
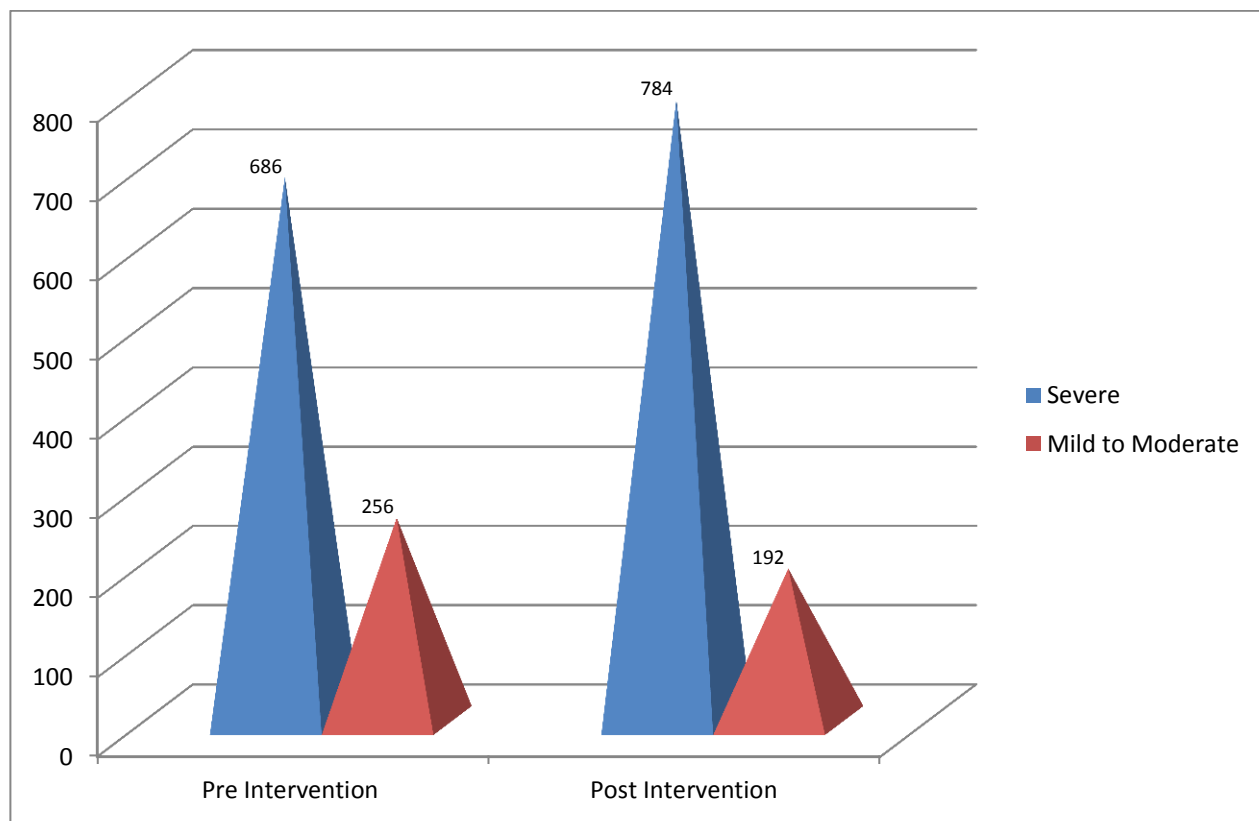

Fig-5- Comparison of cost of therapy is based on condition of anemia during pre-intervention and post-intervention studies

Possible drug interactions

The possibility of potentially serious drug interactions were evaluated in hospitalized patients as well as out-patients. Interactions which were relatively well documented and potentially harmful to the patients were studied.

Incidences of possible drug interactions are presented in Table 13. 20 potentially harmful drug interactions were possible among the prescribed drugs. The study reveals that there was a chance of drug interaction among 6.5% of total study population. Digoxin-Frusemide drug interactions were more common (25%). In outpatient incidence of drug interaction was less. In ward 2 chances of drug interactions was more.

Table -6 Distribution of incidence of possible clinically significant

No.	Interacting Drugs	Incidence			Total (%)
		In-patient		Out-patient	
		ward 1	ward 2		
1.	**Digoxin-Frusemide**		4		4(16)
2.	**Amikacin-Frusemide**		1		1(5)
3.	**Enalapril-Frusemide**		1		1(5)
4.	**Alprazolam-Digoxin**		1		1(5)
5.	**Carbamazepine-Haloperidol**		1		1(5)
6.	**Aspirin -Heparin**		1		1(5)
7.	**Aspirin-Insulin**	1	1		2(10)
8.	**Ciprofloxacin-Theophylline**		1		2(10)
9.	**Ampicillin-Chloramphenicol**				1(5)
10.	**Paracetamol-Chloramphenicol**			1	1(5)
11.	**Carbamazepine-Glibenclamide**				1(5)
12.	**Antacid-Ciprofloxacin**	1			1(5)
13.	**Sodiumvalproate-Phenobarbitone-**	1			1(5)
	Total	**3**	**11**	**1**	**18**

Injection must be administered to patients only in such situations like, when immediate response is required, When drug is not available in any other dosage form, When drug cannot be administered by other safe routes due to patient related factors.

Consultants of outpatient, in many cases, have not included the dispensed drugs in prescription. But documentation of dispensed as well as prescribed drugs is essential to prevent irrationality. The quality of drug is of prime importance to its biological activity. In outpatient dispensing of 'loose' tablets and capsules prevails and quality of such drugs will be affected because of improper storage.

RESULT AND CONCLUSION

The percentage of anemic patient at the time of admission in both the categories was severe 30% and mild to moderate was 70% during pre intervention but in post intervention it was found 22% and 82% respectively. 72% patient having mild to moderate anemia in pre intervention study. While it was 82.88% in post intervention studies.

It is clear that the maximum percentages of the patient are those suffering from mild to moderate anemia. Patients when they were classified on the basis of associated infection it was found that 3.33% and 31.88% had infection during pre-Intervention and Post-Intervention studies. While for mild to moderate it was found 85.70% and 85.36% in pre-Intervention and Post-Intervention studies respectively.

The duration of Hospital stay was found short in case of mild to moderate anemic patients during pre-intervention and Post-Intervention studies. But in case of severely anemic patients the length of hospital stay has increased by two days during pre-intervention and Post-intervention studies.

In the study of cost of therapy it was found that the most portion of the cost of therapy is the amount is spent on antimicrobials but in post-intervention study it was reduced in the patients associated with infection.

In case of severely anemic patient the cost of therapy was found more than to mild to moderate category after intervention the cost of the therapy for the mild to moderate category has decreased because of decrease in duration of hospital stay.

The possibility of potentially serious drug interactions were evaluated in hospitalized patients as well as out-patients. Interactions which were relatively well documented and potentially harmful to the patients were studied.

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1. When immediate response is required
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