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“Intervention of a clinical pharmacist in order to reduce polypharmacy, average cost of therapy and percentage of patients received injections (parenterals) in pediatrics dept; study carried out at multi-specialty teaching hospital”

Mohd Wasiullah,*¹Anil Middha¹, A. Pandurangan²

¹OPJS University, Rajgarh, Churu, Rajasthan-331303,

²Maharishi Markandeshwar University, Mullana, Ambala, Haryana-133207

***Corresponding Author: Mohd Wasiullah**

Email id: iqra_sid2001@yahoo.co.in

ABSTRACT

The drug use in paediatrics is not extensively researched and the range of licensed drugs in appropriate dosage forms is limited. Unless there is a regular supply of safe and effective drugs, public trust and interest in health care will rapidly deteriorate. The study was done in three wards of pediatric of MMMSR, Two hundreds cases of anemia and hundreds 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, fifty cases for inpatient from the different ward and 70 cases for outpatient, for the study of poly pharmacy as well as drug interaction were collected. This was a prospective randomized controlled study and included all patients with severe and mild to moderate anemia, poly pharmacy as well. For urinary infections patients with all age group were included.

Keywords; Polypharmacy, DSPRUD, Cost of therapy, Parenteral, Antimicrobials

INTRODUCTION

The rational use of medicinal drugs is critical to the most important paediatric health care measures. The drug use in paediatrics is not extensively researched and the range of licensed drugs in appropriate dosage forms is limited. Unless there is a regular supply of safe and effective drugs, public trust and interest in health care will rapidly deteriorate. [2-7]

Numerous studies from both developed as well as developing countries have revealed an alarming degree of irrational prescribing in children. This calls for intervention strategies in promoting rational drug therapy and thereby reducing ineffective, unsafe and wasteful prescribing. One among these intervention strategies is the provision of developing treatment guidelines and hence essential drugs list (Nagavi. B.G. et al, 2002). [1]

Presently there are about 20, 000 pharmaceutical manufacturing units in India their products and the

items imported by various agencies together account for over 60,000 formulations and combinations. It is quite natural that the companies resort to aggressive marketing strategies to get their products a reasonable market share. The marketing techniques are targeted at doctors through easy to remember brand names. [8-10]

The deluge has even left the physicians in a dilemma-“what to choose?” hence the words of Hippocrates become more relevant in these days. [11-15]

It is words that the personal ‘ give and take ‘ between physician and detailing person which includes “ scientific information” ‘drug samples’ and reminder items’ provide one of the major underpinnings of the process of drug choice. Unfortunately very few physicians indulge themselves in formal continuing education programme’s after setting up their practice. [17-20]

The World Health Organization (WHO) is advocating the promotion of Rational Drug use by promoting the implementation of standard treatment guidelines and essential drugs. 21-25

The development and implementation of treatment guidelines is in fact a multidisciplinary activity of the health care team in which pharmacist can play an active role. In other words pharmacists can contribute towards the promotion of safe, cost effective and quality used of medicines or rationalization of drug therapy by his active participation in developing and implementing treatment guidelines in a health facility (National Health and Medical Research Council, 1999). [35]

Guidelines may vary in the extent to which they produce improved health outcomes. There are two main reasons; first, acceptance of a guideline is likely to depend on the quality of the evidence on which it is based. Second, the extent to which the potential health is realized from adherence to guidelines will depend on how effectively the guideline is implemented. The guideline recommendation should be based on systematic identification and synthesis of the best available scientific evidence. [26-27]

Rational drug use means medicines are properly and safely administered for the right indication, in the right dose, though the right means. In the right time, for the required full course under adequate supervision, assuring appropriate patients information and complemented with necessary non-drug therapy. [28-30]

Following are the objective of the study (B.S. Balakrishna, 1999);To ensure *availability of safe, essential and quality drugs*, eliminate irrational, useless and hazardous drugs, prepare a graded essential and priority list of drugs depending on actual health needs of the people for different levels of health expertise and services, make drugs available at low prices, ensure quality control of all drugs, ensure drug monitoring and drugs information system for health personnel and consumers, ensure mechanism for ethical marketing and trade practice, promote research and development in accordance with the health needs of the people, provide comprehensive drug legislation and administrative support, [30-34]

Medicines have potent role in the maintenance and restoration of health. They can be hazardous, if improperly used every drug carries with it a certain amount of risk. The words of William withering speaks for itself” Poison in small doses are medicines and medicines in large doses are poisons. [36-40]

There are more than 60,000 formulation of drugs in India, which compares with about 3000 formulation in the Scandinavian countries in India, there is continuous flooding of the market with costly hazardous and irrational drugs, it is estimated than over 20% of the drugs in the country are substandard or spurious.(*Hospital Formulary. MCH, Trivandrum 1997*) [41-48]

DEVELOPING AN STANDARD TREATMENT GUIDELINE

For developing a standard treatment guideline, a multidisciplinary panel that consist or representative of all relevant groups is necessary. This panel consists of Clinical from all disciplines with relevant specialist expertise, Clinicians with general expertise, other relevant health professionals, representatives of consumer groups, experts in research methods relevant to guideline development, health economists, other relevant experts

Before proceeding, the panel should clarify the purpose and target audience for guidelines. This will involve a careful specification of the following.

The conditions and clinical problems that are at issue, the type of care providers for whom the guidelines are intended, the type of consumers for whom the guidelines are intended, a description of consumers not covered by the guidelines, the types of

settings in which the guidelines will be employed, the interventions to be evaluated.

In general the guideline should be the following, Document the purpose for which they were developed, describe each treatment option, describe the natural history or condition of the disease for which the guidelines to be developed, detail the probable outcomes, comprehensive and flexible enough to allow adaptation to the diverse setting and circumstances of day to day clinical practice, potential risks if any in developing treatment guidelines, identify the patient population to which they apply, provide comparison of costs with treatment options, documents the economic appraisals in developing the guideline.

The guidelines do not implement themselves. If the guidelines are to be effective their dissemination and implementation must be vigorously overtaken. If not the time energy and cost devoted to the guidelines development will be wasted and potential improvement in health of patients will be lost. For the dissemination in a proper manner the guideline should be accessible, published, as booklets and the target audience should be informed of the availability of treatment guidelines.

POTENTIAL ADVANTAGE OF TREATMENT GUIDELINES

The guidelines offer a number of potential advantage for physicians, nurses, pharmacist, supply managers and health policy makers, Benefits of standard treatment guidelines include the following; (World Health Forum, 1993)

For patients

Consistency among prescribers- reduced confusion and increased compliance, most effective treatment is prescribed, improves supply of drugs if drugs are prescribed only when needed.

For prescribers

Give expert consensus on most effective economical treatment for a specific setting, provides standard to assess the quality of care, can also provide a basis for monitoring and supervision of prescribing.

For supply management staff

Frame standards for drug supply

- Drug demand is more predictable, thereby forecasting of drug purchase becomes more reliable

For health policy makers

Provides a method to control costs by using drug funds more efficiently, serves as a basis to assess and compare quality of care, developing treatment guideline- role of pharmacist

Guidelines can be developed by -Internal groups-composed entirely of clinicians who will use them, intermediate groups-including some of the clinicians who will use them, External groups-none of them who will use them.

The selection of essential drugs is one of the core principles of a national drug policy because it helps to set priorities for all aspects of the pharmaceutical system.

WHO has defined essential drugs as "those that satisfy the needs of the majority of the population and therefore should be available at all times, in adequate amounts in appropriate dosage forms and at a price the individual and the community can afford". This is a global concept that can be applied in any country in the private and public sectors at different levels of the health care system.

The concept of essential drugs is that a limited number of carefully selected drugs based on agreed clinical guidelines leads to more rational prescribing, to a better supply of drugs and to lower costs. The reasons are obvious:

Essential drugs which are selected on the basis of safe and cost effective clinical guidelines lead to more rational prescribing and therefore to high quality of care and better value for money.

Training of health worker and drug information in general can be more focused, prescribing gain more experience with fewer drugs, and recognize drug interaction adverse drug reaction more easily, quality assurance, procurement, storage, distribution and dispensing are all easier with a reduced number of drugs, the procurement of fewer items in larger quantities results in more price competition and economics of scale, national essential drug lists and national drug formularies, together with clinical guideline, should serve as the basis of formal education and in service training of health, professional, and of public education about drug use. They should also serve as the main basis for public sector drug procurement and distributions, as well as for drug donations.

Factors influencing the prescribing trend

A prescription by a doctor may be taken as the summary of physician's attitude to the disease and the role of drugs in its treatment. It not only reflects the availability of drugs, but also the diagnostic facilities and prevalent pathologies and it provides as insight in to the name of the health care delivery system. The prescribing behaviour depends upon the input from various sources like patients, professional colleagues, academic literatures commercial publicity marketing activities of drug industries and government regulations.^{8,9} Various prescription errors are the result of ineffective use of these inputs and are very common in clinical practice. Lack of continuing medical education leading to ignorance and inappropriate role of senior are also some of contributing factors.

Monitoring of prescriptions and drug utilization study could identify the associated problems and provide feedback to the health professionals so as to create awareness for the Rational Drug Use (N.R Biswas, R.S Biswas, P.S Pal, S.K Jain, and S.P Malhotra, 2000).

Promoting rational use

The Standard treatment guidelines and essential drugs are the basic tools for assisting health professionals to choose the most appropriate medicine for a given patient with a given condition. It should be followed by the appropriate use of the selected medicines. Health care providers and those responsible for dispensing medicines should take every opportunity to inform consumers about the rational use of drugs, including the use of drugs for self medication at the time they are dispensed. (WHO, 2002).

Use of antimicrobial agents

Antimicrobial agents are one of the most commonly used therapeutic classes of drugs in both developed and developing countries (S.C Pradhan, D.G Shewade, Uma Tekur, D.Pachiappan, A.K Dey,

C.Adithan, C.H Shashindran and J.S Bapna, 1990). Excessive and inappropriate use of antimicrobial agents (AMA) in hospital, contributes to the development of bacterial resistance and increased hospital costs (Atanasova and D. Terziivanov, 1995).

The main cause of antibiotic over prescription and prophylaxis is the pressure placed on the physician to do something for the patient. Also the patients

consider that it is their right to consume medicines when they are ill.

Selection of an antimicrobial agent

Antimicrobial agents are used in two general ways: as empirical therapy and as definitive therapy. When an antimicrobial agent is indicated. The goal is to choose a drug that is selective for the infecting microorganism(s) and it is least potential to cause toxicity or allergic reactions (Henry F.C and Merle A.S. Antimicrobial agents, 1996). Whenever the clinician is planning for presumptive bacteriological diagnosis, he has to collect the specimen prior to the institution of drug therapy. Obtaining a culture, in each time of an antibiotic therapy, would be impractical and an unjustified expense. (Jebn. C.B, Michael H.M, Joseph B Jerome, and Mary E.K. Comment, 1974)

AIM OF THE STUDY

The Aim of Study is to specify the impact of clinical pharmacist intervention in terms of minimizing the cost of therapy, avoiding the use of parenteral route especially in case of paediatric, polypharmacy and promoting rational use of antibiotics

MATERIAL AND METHODS

The study was done in three wards of pediatric of MMMSR, Two hundreds cases of anemia and hundreds 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, fifty cases for inpatient from the different ward and 70 cases for outpatient, for the study of poly pharmacy as well as drug interaction were collected.

This was a prospective randomized controlled study and included all patients with severe and mild to moderate anemia, polypharmacy as well. 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, 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.

Analysis of pooled data

The pooled data analyzed after considering expert opinion of the clinicians. The prescription of anaemia 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 treatment protocol.

Adherence of physician

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. anaemia and urinary tract infection in paediatric in

inpatients setting was carried out from May 2014 to September 2015 by collecting details of prescription to fill Performa.

Performa 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 sought, investigations, diagnosis, medication therapy (As entered in prescription), instruction for diet, average cost of prescription drugs/day, discharge advice, any other remarks. Study was divided into two following parts;

In-patient's prescriptions assessment

Hundreds 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 preforma. For any clarification required, patient and the doctor on duty was interviewed.

Out-patient's prescriptions Assessment

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 theses 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 prescriptions were collected from outpatient ward while the doctor was 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.

RESULTS AND CONCLUSIONS

In present study an attempt has been made for the promotion of rational use of drug by introducing standard treatment protocol for anaemia and urinary tract infection in paediatric department of MMIMSR. The epidemiological data's of diseases were collected which are the causes of morbidity in paediatrics. For

the development of treatment guideline, from the above-mentioned disease, the anaemia was selected for pilot study followed by urinary tract infection in paediatrics. For anaemia, the study for prescribing pattern was conducted by collecting 100 prescriptions and the patients were divided into two categories:

The prescriptions was analyzed for Percentage of patients received anti-microbial, average number of drug prescribed per patient per day (polypharmacy), average cost of Therapy, percentage of patient received injection . Prescribed treatment by the physician, were brought for comparison with different standard regularities and number of suggestions were put forward for an effective intervention.

1. Ciprofloxacin with chloramphanecol may be antagonistic so avoid use together.
2. Amikacin with cephalosporin causes nephrotoxicity, ototoxicity, neurotoxicity, so avoid use together.
3. Parenteral iron therapy required only when there is an evidence of malabsorption syndrome, chronic diarrhoea is interference to absorption of oral iron.

Along with all these observation the duration of therapy were also analyzed. The prescribing patterns of the physician in anaemia were report to the physician in time followed by enquiring their opinion too.

Here it was found that maximum number of drug was prescribed to the category of mild to moderate anaemia. While the severe category received low number of drug per patient then mild to moderate. In post intervention study the number of drug for the category mild to moderate, has in decreased.

The number of drugs on each prescription provided the incidence of polypharmacy. (M.V Srishyla, M.A Naga Rani, and C Andrade., 1995) The proportion of drugs per prescription showed a significant difference across different levels of health care as in Table below. 3 drugs per O.P. prescriptions were most common. There were 3 single drug prescriptions in out. But in case of inpatient, it was nil. More than 6 drugs were not prescribed in outpatient.

There was no prescriptions with single drug in I.P. practice, 7 drugs were most common in both hospitals. Average number of drugs per hospitalized patient was 6.04. Average number of drugs per prescription was 3.01 in outpatient. So, average number of drugs per community based O.P. was 3.29.

Categorizations of prescribed drugs are presented in Table 4 and Figure 4 & 5. Among the different categories of drugs used, AMA was the most common. It was 22%, 26%, 42%, wards 1, ward 2 and outpatient respectively. It was followed by analgesic and anti-inflammatory agents, and drugs acting on blood-cvs in both wards (nearly 14% each).

In O.P. practice analgesic and anti-inflammatory agents were prescribed 25% in outpatient. H₁ receptor blockers and respiratory drugs were the third category of drugs that predominated in all outpatients.

However 64%, 82%, and 76% of the patients in ward 1 and 2, outpatients were treated with AMA. Table below and Figure 6 & 7 represent the incidence of AMA use. The predominance of AMA in prescriptions was zero in ward 1, 1 in outpatient and 2 in ward 2. Numbers of AMA per prescription were 1.34 and 1.52 in ward 1 and 2, with average of 1.43 per in-patient. Number of AMA per prescription was 1.27 in out-patient. (Values in brackets are percentages).

Frequency of prescribing of AMA into different classes were analysed, Due to its common use Penicillines and aminoglycosides (19% each), and cephalosporins (33%) were predominated in ward 1 and 2 Aminoglycosides (32%) in outpatient and penicillins (32%). Tetracyclines were not prescribed in ward 2. Co-trimoxazole/chloramphenicol was not prescribed in ward 1. Cephalosporins were not prescribed in outpatient.

It is represented in Table above. Average numbers of drugs per in-patient prescriptions were 6.04 and out-patient prescriptions 3.29. 15% of drugs in I.P. prescriptions and 33% of the drugs in O.P. prescriptions were in generic name. In outpatient most of the drugs (65%) were prescribed in generic name.

44% and 51% of drugs prescribed for I.P. and O.P. were included in WHO essential drug list. 73% of drugs prescribed in outpatient were confirmed with WHO list. In every health facilities, percentage of drugs belonging to National Essential drugs predominated WHO drug list.

Fixed-dose combinations (FDC) were prescribed 16%, 19%, 18%, in ward 1 and 2, outpatient. 15%, 10%, 28%, of FDC prescribed in ward 1 and 2, outpatient.

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.

In Post-Intervention study by use of injection got decreased it was 96% in Pre-Intervention study and 90% in Post-Intervention study.

After comparing the treatment given to the anaemic patients in paediatric ward, four seminar were arranged which were actively and effectively attended by the professors, readers, lecturers and postgraduates. As a result of which following proposal were made

1. Plan of developing treatment guideline &
2. Comparing the treatment given to the anaemic patient in paediatric department with the treatment pattern given by DSPRUD, WHO, IMCI and AIIMS treatment protocol were discussed.
3. Promotion of adequate intake of cereals based diet after six month of life.
4. Avoiding the parenteral rout of administration in paediatric.
5. Counsel mother for breast feeding

Table -1 Average number of drugs prescribed per patientPer day

Category	Pre Intervention	Post Intervention
Severe	4	4
Mild to Moderate	6	5

Here it was found that maximum number of drug was prescribed to the category of mild to moderate anaemia. While the severe category received low

number of drug per patient then mild to moderate. In post intervention study the number of drug for the category mild to moderate, has in decreased.

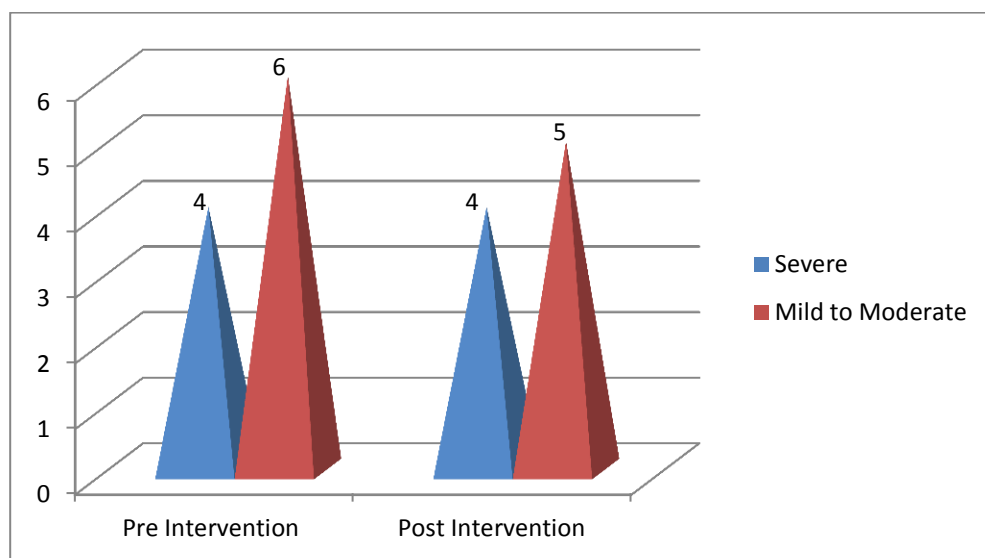


Fig-1 -Comparison of average number of drugs prescribed per patient per day during pre-intervention and post-intervention studies

Incidence of polypharmacy

The number of drugs on each prescription provided the incidence of polypharmacy. (M.V Srishyla, M.A Naga Rani, and C Andrade., 1995) The proportion of drugs per prescription showed a significant difference across different levels of health care as in Table below. 3 drugs per O.P. prescriptions were most common. There were 3 single drug prescriptions in out. But in case of inpatient, it was

nil. More than 6 drugs were not prescribed in outpatient.

There was no prescriptions with single drug in I.P. practice, 7 drugs were most common in both hospitals. Average number of drugs per hospitalised patient was 6.04. Average number of drugs per prescription was 3.01 in outpatient. So, average number of drugs per community based O.P. was 3.29.

Table -2 Incidence of polypharmacy

No. of drugs per prescription	No. of prescriptions		
	In-Patients		Out-patients
	Ward 1 (n = 50)	Ward 2 (n = 50)	(n = 70)
1	0	0	3(4)
2	3(6)	2(4)	19(27)
3	4(8)	4(8)	28(40)
4	6(12)	6(12)	16(23)
5	6(12)	7(14)	3(4)
6	4(8)	7(14)	3(4)
7	11(22)	9(1)	0
8	8(16)	6(12)	0
9	0	5(10)	0
10	4(8)	3(6)	0
11	0	1(2)	0

Values in brackets are percentages

Distribution of different categories of drugs in the prescription

Categorisations of prescribed drugs are presented in Table and Figure. Among the different categories of drugs used, AMA was the most common. It was 22%, 26%, 42%, wards 1, ward 2 and outpatient respectively. It was followed by analgesic and anti-

inflammatory agents, and drugs acting on blood-cvs in both wards (nearly 14% each).

In O.P. practice analgesic and anti-inflammatory agents were prescribed 25% in outpatient. H₁ receptor blockers and respiratory drugs were the third category of drugs that predominated in all outpatients.

Table -3 Categorisation of prescribed drugs

Type of facility	In-Patients		Out-patients
	Ward 1	Ward 2	
No. of prescriptions	50	50	70
Antimicrobial agents	67(22)	76(26)	89(42)
Analgesic and anti-inflammatory agents	42(14)	40(13)	53(25)
Vitamins and minerals	34(11)	24(8)	15(7)
H2-blockers and respiratory drugs	14(5)	33(11)	23(12)
A.P.D. drugs	19(6)	28(9)	6(3)
Other G.I.T. drugs	19(6)	19(6)	7(3)
Drugs for Psychiatric/Neurologic disorders	49(16)	23(8)	6(3)
Drugs acting on Blood/C.V.S.	43(14)	43(14)	3(1)
Antidiabetic drugs	16(5)	6(2)	4(2)
Miscellaneous	2(1)	7(3)	5(2)
Total no. of drugs	289	271	205

Values in brackets are percentages

Use of antimicrobial agents

64%, 82%, and 76% of the patients in ward 1 and 2, outpatients were treated with AMA. Table below and Figure 6 & 7 represent the incidence of AMA use. The predominance of AMA in prescriptions was

zero in ward 1, 1 in outpatient and 2 in ward 2. Numbers of AMA per prescription were 1.34 and 1.52 in ward 1 and 2, with average of 1.43 per in-patient. Number of AMA per prescription was 1.27 in out-patient. (Values in brackets are percentages)

Table-4 Incidence of ama use per prescription

No. of AMA per prescription	No. of prescription		
	In-Patients		Out-patients
	ward 1	ward 2	
	(n = 50)	(n = 50)	(n = 70)
Nil	18(36)	9(18)	17(24)
1	14(28)	16(32)	20(29)
2	7(14)	19(38)	30(43)
3	9(18)	2(4)	3(4)
4	2(4)	4(8)	0

Distribution of drugs among different categories of antimicrobials

Frequency of prescribing of AMA into different classes were analysed, (Table 6, Figure 8 & 9) due to its common use Penicillines and aminoglycosides (19% each), and cephalosporins (33%) were

predominated in ward 1 and 2 Aminoglycosides (32%) in outpatient and penicillins (32%). Tetracyclines were not prescribed in ward 2. Co-trimoxazole/chloramphenicol were not prescribed in ward 1. Cephalosporins were not prescribed in outpatient.

Table -5 Distribution of drugs among different categories of ama

	In-Patients		Out-patients
	ward 1	ward 2	
Penicillins	13(19)	8(11)	15(17)
Cephalosporins	12(18)	25(33)	0
Quinolones	10(15)	8(11)	13(14)
Aminoglycosides	13(19)	20(25)	28(32)
Tetracyclines	3(5)	0	3(4)
Co-trimoxazole and chloramphenicol	0	2(3)	13(14)
Miscellaneous	16(24)	13(17)	17(19)
Total no. of drugs	67	76	89

(Values in brackets are percentages)

SUMMARY OF EVALUATION OF PRESCRIBING INDICATORS

It is represented in Table 7. Average numbers of drugs per in-patient prescriptions were 6.04 and outpatient prescriptions 3.29. 15% of drugs in I.P. prescriptions and 33% of the drugs in O.P. prescriptions were in generic name. In outpatient most of the drugs (65%) were prescribed in generic name.

44% and 51% of drugs prescribed for I.P. and O.P. were included in WHO essential drug list. 73% of drugs prescribed in outpatient were confirmed with WHO list. In every health facilities, percentage of drugs belonging to National Essential drugs predominated WHO drug list.

Fixed-dose combinations (FDC) were prescribed 16%, 19%, 18%, in ward 1 and 2, outpatient. 15%, 10%, 28%, of FDC prescribed in ward 1 and 2, outpatient.

Evaluation of health facility indicators

The ward and outpatient under study neither had its own formulary or essential drug list, nor did they follow WHO or National essential drugs list. Ward 1 and 2 contained a Hospital Pharmacy each, which was capable of providing all prescribed drugs. And out-patients who visited consultants had to relay on the nearby drug store.

Evaluation of rationality

Present study revealed that 40% of medication orders of ward 1 and 52% of medication orders of ward 2 contained prescription errors. Out-patient prescription errors were found to be 54%. The most common type of errors was inappropriate dosage strength and schedule, and inadequate duration of therapy. Drug-drug interactions were also present.

Table – 6 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.

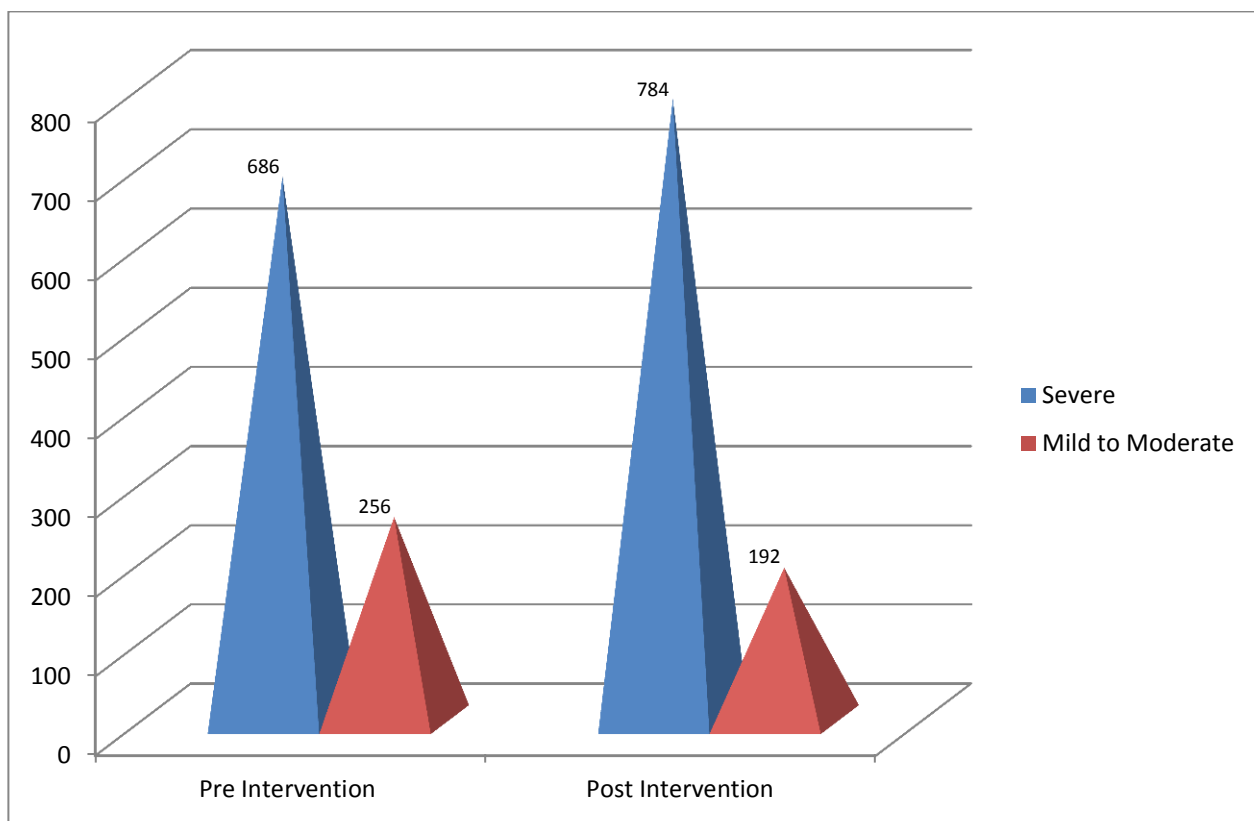


Fig-2-Comparison of cost of therapy is based on condition of anemia during pre-intervention and post-intervention studies

Table – 7 Use of injection (parenterals)

Pre-Intervention	96
Post-Intervention	90

In Post-Intervention study by use of injection got decreased it was 96% in Pre-Intervention study and 90% in Post-Intervention study.

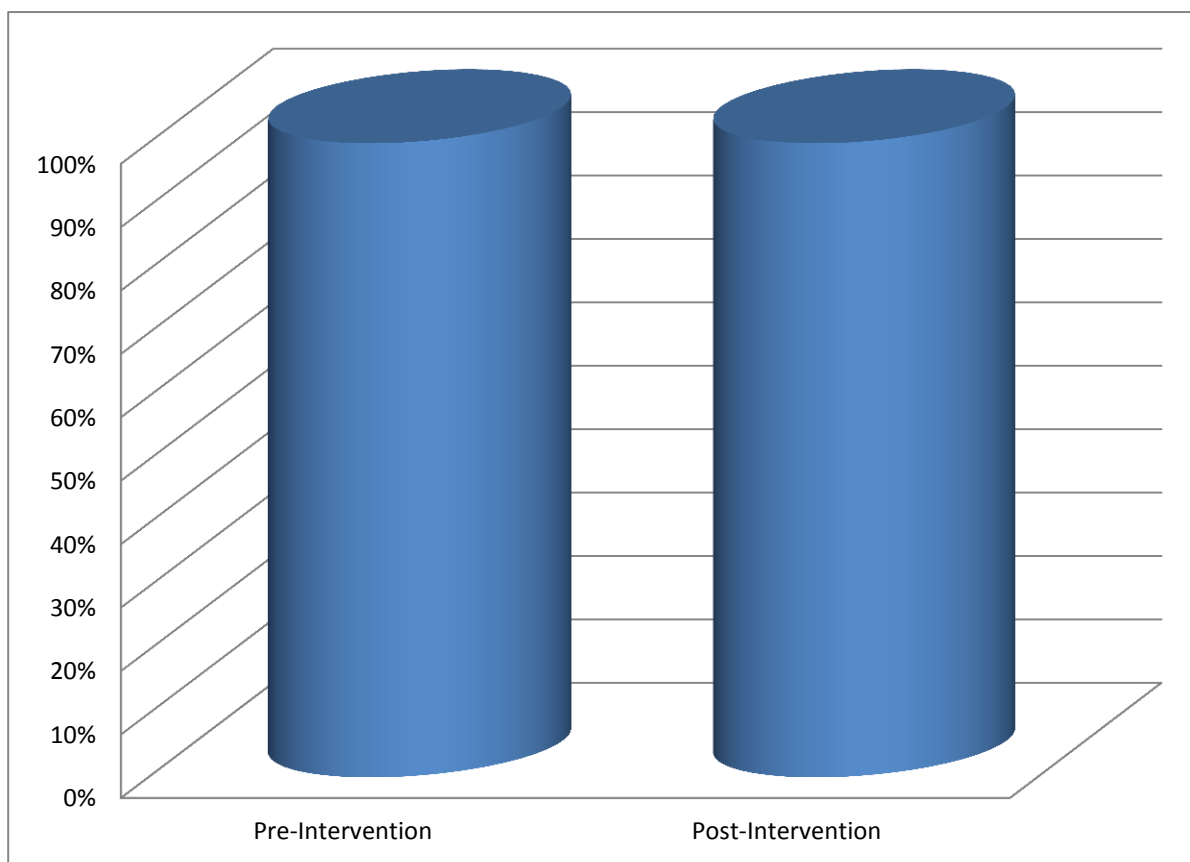


Fig-3-Comparison of percentage of the patient received injection during pre-intervention and post-intervention studies

RESULT AND DISCUSSION

In present study an attempt has been made for the promotion of rational use of drug by introducing standard treatment protocol for anemia and urinary tract infection in pediatric department of MMIMSR. The epidemiological data's of diseases were collected which are the causes of morbidity in pediatrics. For the development of treatment guideline, from the above-mentioned disease, the anemia was selected for pilot study followed by urinary tract infection in pediatrics. For anemia, the study for prescribing pattern was conducted by collecting 100 prescriptions and the patients were divided into two categories:

The prescriptions was analyzed for Percentage of patients received anti-microbials, average number of drug prescribed per patient per day (polypharmacy), average cost of Therapy, percentage of patient received injection . Prescribed treatment by the physician, were brought for comparison with different standard regularities and number of suggestions were put forward for an effective intervention.

1. Ciprofloxacin with chloramphenicol may be antagonistic so avoid use together.
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Along with all these observation the duration of therapy were also analyzed. The prescribing patterns of the physician in anemia were report to the physician in time followed by enquiring their opinion too.

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There was no prescriptions with single drug in I.P. practice, 7 drugs were most common in both hospitals. Average number of drugs per hospitalized patient was 6.04. Average number of drugs per prescription was 3.01 in outpatient. So, average number of drugs per community based O.P. was 3.29.

Categorizations of prescribed drugs are presented in Table 4 and Figure 4 & 5. Among the different categories of drugs used, AMA was the most common. It was 22%, 26%, 42%, wards 1, ward 2 and outpatient respectively. It was followed by analgesic and anti-inflammatory agents, and drugs acting on blood-cvs in both wards (nearly 14% each).

In O.P. practice analgesic and anti-inflammatory agents were prescribed 25% in outpatient. H₁ receptor blockers and respiratory drugs were the third category of drugs that predominated in all outpatients.

However 64%, 82%, and 76% of the patients in ward 1 and 2, outpatients were treated with AMA. Table below and Figure 6 & 7 represent the incidence of AMA use. The predominance of AMA in prescriptions was zero in ward 1, 1 in outpatient and 2 in ward 2. Numbers of AMA per prescription were 1.34 and 1.52 in ward 1 and 2, with average of 1.43 per in-patient. Number of AMA per prescription was 1.27 in out-patient. (Values in brackets are percentages).

Frequency of prescribing of AMA into different classes were analysed, Due to its common use Penicillines and aminoglycosides (19% each), and cephalosporins (33%) were predominated in ward 1 and 2 Aminoglycosides (32%) in outpatient and penicillins (32%). Tetracyclines were not prescribed

in ward 2. Co-trimoxazole/chloramphenicol was not prescribed in ward 1. Cephalosporins were not prescribed in outpatient.

It is represented in Table above. Average numbers of drugs per in-patient prescriptions were 6.04 and out-patient prescriptions 3.29. 15% of drugs in I.P. prescriptions and 33% of the drugs in O.P. prescriptions were in generic name. In outpatient most of the drugs (65%) were prescribed in generic name.

44% and 51% of drugs prescribed for I.P. and O.P. were included in WHO essential drug list. 73% of drugs prescribed in outpatient were confirmed with WHO list. In every health facilities, percentage of drugs belonging to National Essential drugs predominated WHO drug list.

Fixed-dose combinations (FDC) were prescribed 16%, 19%, 18%, in ward 1 and 2, outpatient. 15%, 10%, 28%, of FDC prescribed in ward 1 and 2, outpatient.

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.

In Post-Intervention study by use of injection got decreased it was 96% in Pre-Intervention study and 90% in Post-Intervention study.

After comparing the treatment given to the anemic patients in pediatric ward, four seminar were arranged which were actively and effectively attended by the professors, readers, lecturers and postgraduates. As a result of which following proposal were made

1. Plan of developing treatment guideline &
2. Comparing the treatment given to the anemic patient in pediatric department with the treatment pattern given by DSRUD, WHO, IMCI and AIIMS treatment protocol were discussed.
3. Promotion of adequate intake of cereals based diet after six month of life.
4. Avoiding the parenteral rout of administration in paediatric.
5. Counsel mother for breast feeding

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