Original Research Article

Study of the effect of pharmacotherapeutic audit meetings on prescription writing in a tertiary care center-an interventional study

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ABSTRACT

Background: Rational drug prescription is a practice when an appropriate drug with correct dosage, formulation, frequency and duration is prescribed. Prescription audit with the help of regular Pharmaco-therapeutic audit meetings (PTAM) is a continuous cycle, involving observing practice, setting standards, comparing practice with standards, implementing changes and observing new practice. World health organization (WHO) and international network for rational use of drugs (INRUD) jointly provided a few prescription and drug use indicators to guide rational prescription writing practice. Aim of the study was to assess the effect of pharmaco-therapeutic audit meetings on prescription writing and its rationality.
Methods: This was a single center cross-sectional, prospective study conducted over a period of 14 months (December 2018-February 2020). Prescriptions from outpatient departments of general medicine, pulmonary medicine, physical medicine and rehabilitation (PMR), community and family medicine (CFM), pediatrics and psychiatry were collected. All the collected prescriptions were screened for rationality using WHO/INRUD core indicators and the index of rational drug prescribing was calculated. Prescriptions beyond acceptable limit were discussed in PTAM and same process was repeated over next 2 months to assess change in prescribing patterns after PTAM. Chi-square and student's t-test was used for statistical analysis.
Results: Statistically significant change in proportions for antibiotic prescribing was 3.4% [95% CI (-1.7%-9.4%), p=0.20] and prescriptions with generic name drugs was 10.5% [95% CI (6.1-14.6%) p<0.0001 was seen while no significant change was seen in injectable preparation use 0.6% [95% CI (-0.6%-1.5%); p=0.26)] and prescriptions from essential drug list (EDL) 0.5% [95% CI (-4.2%-5.4%) p=0.83].
Conclusions: Our study showed that PTAM is an effective way to improve rationality of prescriptions and must be done regularly for improving prescribing practices.

Keywords: Prescriptions, Pharmacotherapeutic audit meeting, Tertiary care, WHO/INRUD drug prescribing indicators

INTRODUCTION

A medication or drug is a chemical substance which has a physiological effect when introduced in the body. It aids to improve quality of life by acting either on symptomatology or its underlying cause. Hence, it is essential to prescribe the drug with correct dosage, formulation, frequency and duration. It is an art to write a prescription rationally. A doctor must learn to follow the ideal writing practices.

An ideal prescription contains patient's identification (name, age, sex, guardian's name), inscription, subscription, instructions and signatures of the doctor. Many indices have been laid to assess the rationality of prescriptions. To promote rational prescribing, WHO and INRUD jointly provided a prescribing indicator, patient care indicators, healthy facility, complimentary drug use indicators.[1] WHO has announced the third global patient safety challenge as "medication without harm" in 2017.[2] Its aim is to "reduce the level of severe, avoidable harm

related to medication by 50% over 5 years globally". To assess the harm encountered with a medication error, two main essential steps include the identification of harm and classification of the degree of harm. Some other indices for geriatric age group include the Beer's criteria, STOPP (screening tool for older person's prescriptions) and START (screening tool to alert doctor's to right treatment)[3] criteria, Phadke's criteria. All these indicators target rational prescriptions to the patient group.

Prescription audit is needed to evaluate rational use of drugs and to magnify utilization of resources making medical care rational and cost effective. Prescription audit is a continuous cycle, involving observing practice, setting standards, comparing practice with standards, implementing changes and observing new practice.

PTAM are an amalgam of intervention, teaching and prescription audit. It includes a joint elaborative discussion about rational use of drugs, recent advances in management of disease conditions. The prime aim is to generate rational prescriptions. PTAM groups include representatives from respective departments, administration clinical pharmacology and clinical microbiology during which information and views about pharmacotherapy for a particular patient or group are exchanged. In light of above facts, we had planned this study to assess impact of PTAM on promoting rational and quality prescription writing. The prime aim of this study was to minimize common prescription errors, and hence promoting improved patient care.

METHODS

This was a single center, cross-sectional, prospective study conducted over a period of 14 months (December 2018-February 2020) on prescriptions from outpatient clinics of general medicine, pulmonary medicine, PMR, community and family medicine (CFM), pediatrics and psychiatry after seeking approval from institute ethics committee. Prescriptions were collected from the retail pharmacy and the data was extracted on a customized case record form. The prescription slips were analyzed for the documentation of various components like demographic details, provisional/definitive diagnosis and treatment. Also, the drug dosage, duration of therapy, frequency, and formulation was noted in case record forms.

All prescriptions were analyzed for calculating WHO core prescribing indicators. Assessment to determine levels of rational prescribing was done by employing the indices of rational drug prescribing (IRDP) developed by Zhang and Zhi (REF).[6] For calculation of average number of drugs prescribed, rational antibiotic and injection safety indices, following formula was used:
Index=Optimal value/observed value

All other indices (index of generic name, index of essential drugs list (EDL) was calculated by the following formula:
Index=Observed value/Optimal value

The optimal index for all indicators was 1. Values closer to 1 indicated rational drug use and vice versa. Index of rational drug prescribing (IRDP) was calculated for all prescriptions by adding the index values of all prescribing indicators.

Thereafter, an audit meeting was held to discuss the practical issues and prescriptions failing to meet expectations were investigated with a special emphasis to modify and improve the same. This process was repeated after a stipulated time and the impact of PTAM was noticed with respect to the WHO core prescription indicators. First PTAM was conducted in December, 2019 and second in month of March, 2020.

Statistical analysis

All data collected was expressed as percentage in tables. Chi-square test was used to compare categorical data, and Student's *t*-test was used for continuous variables. Significance of results was expressed as p value of <0.05 for each parameter with 95% confidence interval (CI). Data analysis was done using Microsoft excel-2016.

RESULTS

A total of 177 and 379 prescriptions were screened for 1st and 2nd PTAM respectively. 51.4 and 47.7% prescriptions from patients with age <40 years were included in 1st and 2nd PTAM respectively. Other age-groups were 40-60 and > 60 years of age. 14.6 and 13.1% of prescriptions from elderly (>60 years) were included in 1st and 2nd PTAM respectively. The mean age of patients in 1st and 2nd PTAM was 36.6±15.2 and 36.9±14.8 years respectively. There was almost equal distribution across genders in prescriptions collected for screening in 1st and 2nd PTAM, mentioned in Figure 1.
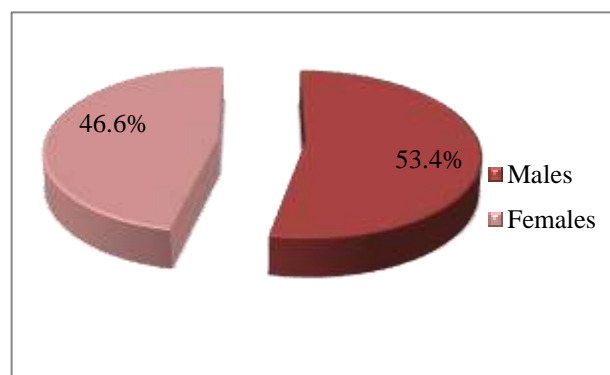

Figure 1: Gender distribution of patients whose prescriptions were analyzed.

It has been strictly regulated by medical council of India (MCI) that each drug must be prescribed by its generic name. In our study, it was observed that a significant increment in prescriptions containing generic names occurred after PTAM, especially in the departments of general medicine, pulmonary medicine, CFM and PMR.

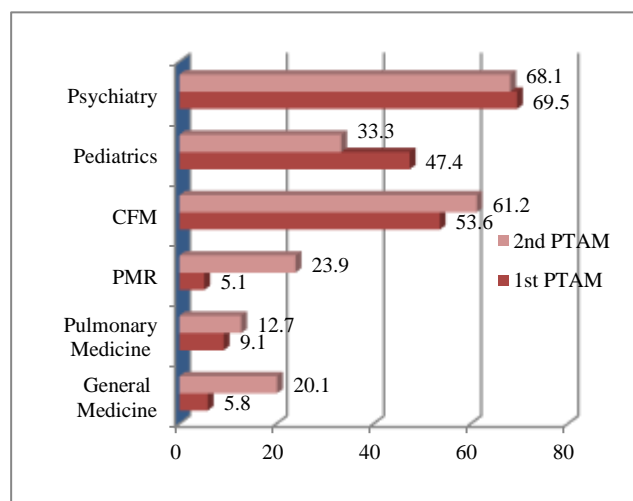However, no significant improvement was noticed in the department of psychiatry and pediatrics.

Figure 2: Percentage of prescriptions prescribed by generic names.

Another important WHO indicator is the average number of drugs per encounter. In our study, an improvement was seen in the department of pediatrics, CFM and PMR with a decline in average number of drugs per prescription. Pulmonary medicine and general medicine did not have a noticeable decline in this aspect which was probably due to varying multiple unrelated complaints or addition of supplements in a few prescriptions as per individual patient requirement.
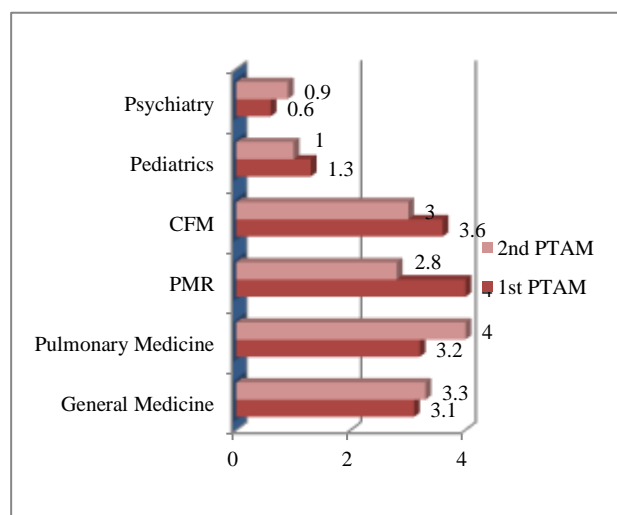

Figure 3: Average number of drugs per encounter.

An essential drug list (EDL) framed by the government of India, includes those medicines that satisfy health care needs of populations. This should be readily accessible and should have low cost making them affordable to each. In our study, an improvement was noticed in prescriptions written from EDL. Department of pediatrics and PMR showed improvement while others did not (Figure 4).
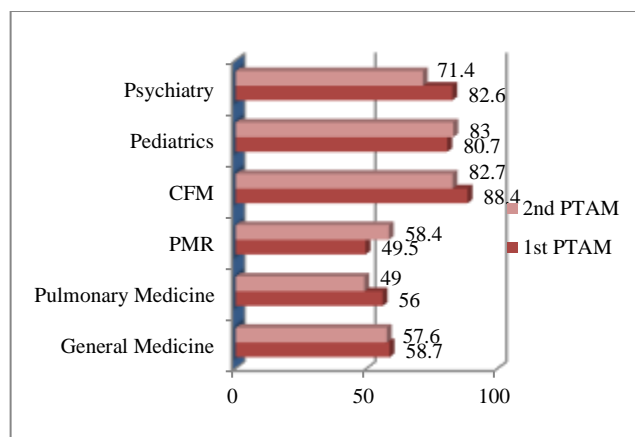

Figure 4: Percentage of drugs prescribed from national list of essential medicine/essential drug list.

Other important components of a prescription include the diagnosis, duration, frequency, the percentage of injectable formulation prescribed and the percentage of antibiotic prescribed per prescription. In our study, no difference was noted in use of injectable formulation. An improvement was noticed in prescriptions in dosage and duration of therapy documentation. Also, an improvement in use of antibiotics was seen from 11.8% in 1st PTAM to 8.4% in 2nd PTAM. Figure 5 shows a marked improvement in various parameters after PTAM.
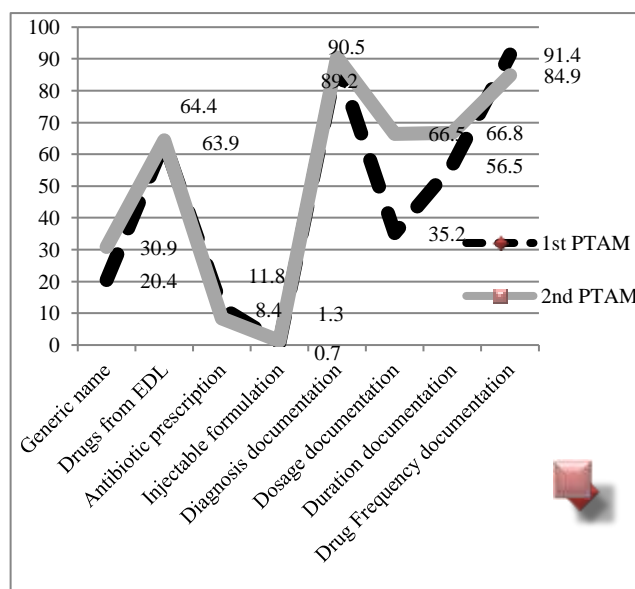

Figure 5: Parameters observed in prescriptions and the effect of PTAM.

As far as antibiotic use is concerned, a decline in overall antibiotic use was seen after PTAM intervention, although it was not statistically significant ($p=0.20$). However, it was seen that the majority of antibiotics were prescribed by department of pediatrics and pulmonary medicine. The major class of antibiotic prescribed were beta lactams, followed by macrolides, fluroquinolones and tetracyclines in their decreasing order of usage (Table 1).

A decline was observed in terms of antibiotic prescribing practice from 11.8 to 8.4% in 1st and 2nd PTAM respectively. However non-significant difference was noted in other parameters (Table 2).

Table 1: Classes of antibiotics prescribed.

Specialty	PTAM (n)	Antibiotics								Total (%)	P
		Beta-Lactam (Penicillins)(Cephalosporin)(Carbapenems)	Tetracyclines	Macrolides	Aminoglycosides	Fluoroquinolones	Urinary Antiseptics	Oxazolidinone	Anti-fungal		
General medicine	1st PTAM (55)	1	-	2	-	-	-	-	-	3 (5.5)	0.77
	2nd PTAM (90)	2	1	1	-	2	-	-	-	6 (6.7)	
Pulmonary medicine	1st PTAM (34)	5	-	1	-	-	-	-	-	6 (17.6)	0.18
	2nd PTAM (69)	2	1	2	-	1	-	-	-	6 (8.7)	
PMR	1st PTAM (29)	-	-	-	-	-	-	-	-	-	-
	2nd PTAM (60)	-	-	-	-	-	-	-	-	-	
CFM	1st PTAM (19)	2	-	-	-	-	-	-	-	2 (10.5)	0.89
	2nd PTAM (64)	4	-	2	-	-	-	-	-	6 (9.4)	
Pediatrics	1st PTAM (28)	10	-	-	-	-	-	-	-	10 (35.7)	0.45
	2nd PTAM (51)	9	-	3	-	2	-	-	-	14 (27.5)	
Psychiatry	1st PTAM (12)	-	-	-	-	-	-	-	-	-	-
	2nd PTAM (45)	-	-	-	-	-	-	-	-	-	
Total and (%) of antibiotic PTAM-wise	1st PTAM (177)	18 (85.7)	-	3 (14.3)	-	-	-	-	-	21 (11.8)	0.20
	2nd PTAM (379)	17 (53.1)	2 (6.3)	8 (25)	-	5 (15.6)	-	-	-	32 (8.4)	
Total antibiotics in each class (556)		35	2	11	-	5	-	-	-	53 (9.5)	

Table 2: Indices for various WHO core prescribing indicators.

Core indicators		Antibiotic prescribing	Average no. of drug	Safety injection	Generic name index	Essential medicine index
Optimal level		≤ 30%	≤ 3	≤ 10	100%	100 %
Observed value	1st PTAM	11.8	3	0.7	20.4	63.9
	2nd PTAM	8.4	2.9	1.3	30.9	64.4
Index	1st PTAM	2.5	1	0.07	0.20	0.63
	2nd PTAM	3.5	1	0.13	0.30	0.64

For calculating average no. of drug rational antibiotic and injection safety indices, the following formula was used: *Index=Optimal value/observed value All other indices (index of generic name, index of EDL, consultation time index, dispensing time index, index of drugs actually dispensed, index of labelling of drugs, will be calculated by the following formula.

Index=Observed value/optimal value.

DISCUSSION

All the prescriptions collected from respective departments were screened for rationality using WHO/INRUD core prescribing indicators. A few prescriptions were discussed in a joint group meeting comprising of members (faculties) of respective departments and academic section. PTAM was conducted after the first screening and response to first PTAM was presented and discussed in second PTAM conducted thereafter. The usefulness of PTAM in improving the rationality of prescription writing was observed with the aid of WHO/INRUD core indicators. This study was done on a total of 556 prescriptions from outpatient medical departments and results evaluated to see the effect of PTAM on WHO core indicators.

It was seen that the basic patient credentials/superscript (name, age, weight, address, attending physician and date) were complete in all the prescriptions. As our hospital is using e-hospital application, which issues the OPD slip only after these information's are provided to the registration counter person, there was no prescription with such errors.

As far as documentation of patient's disease diagnosis was concerned, we observed that in our study 89.2% prescriptions analyzed in 1st PTAM and 90.5% of prescriptions in 2nd PTAM were complete. Previous studies done by Saha, Sandip, Mishra and Ahsan et al had 40, 47, 70, and 56% documentation rates respectively.[7-10]

Documentation of dosage preparation is essential for a prescription slip. In our study, only 35.2% prescriptions in 1st PTAM had dosage documentation, which drastically improved to 66.5% in prescriptions analyzed for 2nd PTAM. This was in discordance with a study done by Ahsan et al.[10] and Raman et al.[11] with 76 and 83.5% documentation rates respectively. This discrepancy was probably due to lesser duration of studies (less than 6 months), good teaching and prescription writing practice, and use of fixed-dose combination.

An ideal prescription must contain minimal number of injectable formulations and our study showed a rate of 0.7% in 1st PTAM and 1.3% in 2nd PTAM. This result was in concordance with a study done by Saha, Rehan et al.[7,12] with a rate of 1.1 and 0.7% respectively. Some other studies with much higher antibiotic usage rates were found in past studies done by Darji, Ahsan, Aravamuthan, Mishra, with 29%, 7.5%, 7.2% and 6.1% respectively.[9,10,13,14]

Drug frequency is one of the commonly omitted components in prescriptions. In our study, we found that in prescriptions analyzed for 1st PTAM, only 8.6% of them had omitted writing frequency of drug intake, which was 15.1% in the prescriptions analyzed for 2nd PTAM. Limited data was available for this parameter studied in past. A study done by Sandip et al.[8] showed an omission rate in prescriptions up to 14.2% which was slightly higher than our study. Our study showed better result in this aspect.

In our study, we found that 43.5% prescriptions from all the departments collectively were found deficient in writing duration of treatment in 1st PTAM. This percentage improved to 33.2% in prescriptions analyzed for 2nd PTAM. We observed a significant improvement in this parameter. This was higher than the results of a study done by Ahsan and Patel et al with 13 and 21% rate of omission.[10,15] While our study had better result when compared to study done by Mishra et al with 72.5% prescriptions deficient in documentation of duration on prescriptions.[9]

One of the most important components in the inscription is writing a drug by its generic name. In our study, we found that 20.4% drugs were written by their generic names in prescriptions analyzed for 1st PTAM, which improved significantly to 30.9% in prescriptions analyzed for 2nd PTAM. In some studies, the rate of generic name writing was much higher, as in study done by Darji and Rishi et al with 63.3%, 51% rates respectively.[10,13] In study done by Ahsan, Aravamuthan, Mishra, Abidi et al, the rate of generic name writing was 0, 2.5, 3.7 and 3.7% respectively.[9,10,14,17] Our study had lower overall rate of prescribing drugs by their generic name owing to the physician's concern to write a better-quality drug of a different brand. In both the PTAMs, it was highlighted by physicians, that they trusted a couple of brands to be of good quality over others.

A national list of essential medicines (NLEM)/EDL framed by the government of India, includes those medicines that satisfy health care needs of populations. In our study, 63.9% prescriptions had drugs written from EDL in 1st PTAM, which improved to 64.4% in prescriptions analyzed for 2nd PTAM. Studies done by Ahsan et al and Darji et al showed a rate of 79 and 73% respectively which was much higher than our study.[10,13] This gross difference was probably because, tertiary care centers run super-specialty clinics, with advanced diseases and newer drugs which might not fall into the essential drug list.

As far as antibiotic use was concerned, our study found that, the percentage of prescriptions containing antibiotics was 11.8% in 1st PTAM which improved further to 8.4% in 2nd PTAM. Our study showed excellent results when compared with other studies done in the past. Darji, Ahsan, Aravamuthan et al showed a rate of 21.1%, 39% and 22% respectively.[10,13,14] This was a result of the ongoing "antibiotic Stewardship programme" at regular basis and awareness among the clinicians. Beta-lactam class was most prescribed class of antibiotics across all departments. This is in agreement with the fact, that most of infections in community can be managed with beta-lactams only and other classes may not be required.

CONCLUSION

There was a significant improvement in quality of prescription in making disease diagnosis, prescribing with appropriate dosage and frequency of mentioning generic names. Moreover, there was also an improvement in rational antibiotic prescribing which showed the potential of PTAM as intervention could effectively counter antibiotic resistance. Improved quality of prescription was evident from limited use of injectable formulations in the study. Index system for drug utilization is important to gauge performance of healthcare system based on WHO core indicators. Index system analysis for drug utilization was convincingly found to be within optimal values.

Our research showed PTAM could be effective tool to implement WHO/INRUD drug prescribing indicators robustly.

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