

A Study to Evaluate Prescribing Indicators of Prescription Pattern Practiced by Interns in an Urban Health Center.

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ABSTRACT

Submitted: 15/08/2012

Accepted: 13/11/2012

Background: It is essential that the prescribing and administration of drugs should be evaluated from time to time, to quantify the error in such procedures, and look for possible solutions for an effective utilization of the enormous resources spent on drugs. **Objectives-** To evaluate prescribing indicators of prescriptions using WHO recommended tools for core drug use and the quality of prescriptions in terms of expected norms of format of prescriptions. **Methods:** The study was carried out in urban health center attached to teaching college with Informal experimental design. Sample size was 230 prescriptions of interns from each group. The prescriptions were selected using systematic random sampling technique and evaluated. Knowledge of patients regarding prescriptions was assessed. **Results:** The average number of drugs prescribed per prescription was found to be 3.2 ± 1.106 . Percentage of drugs prescribed by generic name was increased in study group (66.1%) as compared to from in control group (43%). Percentage of drugs prescribed from essential drug list was increased from 19.6% in control group as compared to 34.3% in study group. There was significant improvement in writing superscription, inscription, and transcription in the study group as compared to control group. Patient's knowledge regarding prescription also improved in few aspects in the study group as compared to control group. **Conclusion:** Structured training on pharmacotherapy based on workshop pattern with focus on problem solving exercises can be helpful to improve prescribing skills of interns and may be introduced in regular internship orientation programme.

Keywords: Prescription, Prescribing indicators, intern.

INTRODUCTION

The prescribing of medicines is an integral part of the provision of health and represents a relatively safe, effective, and inexpensive mode of treatment.¹ Rational use of drugs is multifaceted. Its medical, social and economic aspects are well reflected in the WHO definition: "Rational use of drugs requires that patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements for an adequate period of time, at the lowest cost to them and their community."² For an effective utilization of the resources spent on drugs, it is essential that the prescribing and administration of drugs be evaluated from time to time, to quantify the error in such procedures, and look for possible solutions. Errors can be during prescription, administration, transcription, or dispensing of the drug.³ While conferences and workshops do provide a means of spreading the message of Rational Drug Use (RDU), the effect is rather limited because of the simple reason that most of the doctors already have fixed ideas and attitudes regarding drug prescription. Internship is a period, which provides us with a susceptible population having a 'Virgin' mind and any intervention is

bound to be highly effective during this period.⁴ Looking into the fact that the majority of prescription-related errors in hospital environment are made by junior doctors, there is a need to educate the interns and develop an module that will improve their prescription qualities.

MATERIALS AND METHODS

The study was carried out in urban health center attached to teaching college with informal experimental design in July 2010 - July 2011. Each batch of interns were posted at the center for period of 15 days. The sample size was calculated by finding out the percentage of intern's prescription out of total prescriptions and prevalence of appropriate prescription using a scale by conducting pilot study. The sample size for each group consisted of 230 prescriptions of interns from each study and control group. Prior permission of institutional ethical committee was obtained during planning phase of the study. The alternate batches of interns were divided into study (6 batches) and control group (6 batches). Intervention in the form of structured training on pharmacotherapy was given to study group. Intervention was given to the study group in the form of demonstration, focus group discussion and problem solving exercises for first 3 days of the posting for 1-11/2 hrs. As interns may become apprehensive regarding their evaluation of prescription, they were explained regarding the nature and purpose of study, benefits of the study were

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explained to them and informed consent was taken. They were explained that their identity will not be revealed after taking part in this study. After gap of one week prescriptions were collected last 5 days of posting. Interns were asked to keep the carbon paper below the prescription. Prescriptions were selected by using systematic random sampling technique. Carbon copies of the prescriptions were collected before they were scrutinized by immediate supervisor like RMOs and faculty members. Prescriptions collected from patients of both the groups were evaluated for prescribing indicators and quality of prescriptions in terms of expected norms of format of prescriptions. Patient's knowledge regarding prescription was assessed after obtaining their informed consent in both the groups using pre-designed semi structured questionnaire.

All 460 Prescriptions were evaluated with regards to following prescribing indicators.⁶ Average No. of drugs per encounter, Percentage of generic drug prescribed Percentage of drugs prescribed from essential drugs list or formulary, Percentage drug combination prescribed per prescription, Percentage of encounters with an injection prescribed.

Quality of the prescription in the form of legibility of prescription, clarity of dose and quality of prescription using pre-validated four point rating scale.⁵

Layout of prescription in the form of presence of sigma (Symbol-Take Though), Order of prescription, Dosage form, Dose Strength written and Dose Strength correct (both by pre-validated four point rating scale), Frequency and duration of drug, complete Instruction to pharmacists, complete Instruction to patients, Signature of prescriber.

Appropriate prescription scale which was designed with the help experts in the pharmacology and community medicine based on above prescribing indicators and standard format of the prescription was applied to all the prescriptions collected.

Cost of prescription was determined by taking into account individual cost of each drug form pharmacy department records and available literature (e.g. CIMS). Statistical analysis was done by using SPSS 17 software.

RESULTS

The results were obtained after evaluation of prescriptions of interns in both study and control groups with respect to expected norms of format of prescription and WHO/INRUD recommended prescribing indicators.

Average of number of drugs per prescription is more than two in both study and control group WHO recommends on an average less than two drugs per prescription.⁷ The table 1 indicates prescribing problem and justifies further investigation. The number of prescription containing more than two numbers of drugs per prescription has increased in

the study group (75.7%) as compared in control group (74.8%) The difference is not significant by Mann-Whitney test (Z score-.608, P value .543).

Percentage of drugs prescribed by generic name per prescription was increased in study group as compared to control group. Total 1473 drugs were prescribed of which 1238 were generically prescribed (84.04%) in both study and control group and the difference was significant by Mann-Whitney test (Z score -5.821 and P value=0.000).

Total 1473 drugs were prescribed out of which 994 were found to be from essential drug list (67.48%) from both study and control group. The difference was statistically significant by Mann-Whitney test. (Z score = -4.266 and, P value=0.00).

Urban health centre under present study had provision of injectable only for immunisation in OPD services hence percentage of injectable prescribed was very less.

In control group 54.4% of prescriptions were containing drug combination while as in the study group these has been reduced 37%. This decrease in percentage of drug combination prescribed can be attributed to the decrease in the unnecessary use of antimicrobials, vitamins, cough preparations which are the most common form of drug combination prescribed in the health centre under study. (Z score -3.395 and P value=0.001).

Table 2 shows that majority of the prescriptions were legible hence further evaluation of them on other attributes of prescription was possible.

There was improvement legibility of prescription after the intervention in the study group. Mann-Whitney U test showed p value =0.06, z score=-1.86 hence statistically insignificant. Clarity of dose of prescription which includes strength of dose and total daily dosage. The prescriptions in which in which clear dose stated for all medicines has increased in study group as compared to control group. There was improvement clarity of dose of prescription after the intervention as seen in above table (p value was 0.045, z score=-2.402).

There was improvement in clarity of instruction of prescriptions in study group as compared to control group after the intervention as seen in above table, Mann-Whitney test showed the results statistically insignificant.

In study group the increased number of prescriptions fulfilled the criteria of superscription (i.e. Sigma-Rx) as compared to the control group. (p value =0.0004, z score=-3.555) as seen in table 3.

In study group increased number of prescription were containing correct order of prescription. (P value =0.0001, z score=-4.462).

In study group, prescriptions having dosage form written on them has increased as compared to control group. This difference on applying Z test of two proportion (p value =0.035, z score=-2.106) was found to be statistically significant.

Prescriptions in which duration of administration of drug was written and that was found to be correct according to expected norms for that particular drug and particular illness was taken into consideration.

In study group percentage of prescriptions mentioning correct duration has increased as compared to control group. The difference was statistically significant (p value=0.0001, z score=-3.949) as shown in table 4.

In almost all prescriptions collected in this study there were no explicit directions to the pharmacist regarding the dosage form and total amount to be dispensed and in study group prescriptions mentioning instruction the pharmacist has not improved even after intervention.(table no :4).

In the study group prescription containing instruction to patients (like route of administration of the drug, relationship with meals etc.) has increased as compared to control group. In study group prescriptions containing signature (89.6%) has increased as compared to prescription in control group (53%). The difference was statistically significant (p value< 0.0001, z score=-8.6765).

Table 5 shows that average cost per prescription has decreased in study group as compared to control group. The difference was significant by Mann-Whitney test (Z score=-3.204, P value=0.002).

The decrease in cost has been attributed to decrease use of antimicrobials, vitamins/minerals, and cough preparations in the study group as compared to control group.

The overall decreased cost is because the medications were given to patients only for three days in hospital as there was protocol in this hospital to give the medication for three days for most of the medications.

In the study group the appropriate prescriptions (Total score>80%) were increased as compared to the control group. 66.1% in the control group and 55.7% of the prescriptions in the study group were near appropriate (Total score>60%).

In the control group 31.7% of the prescriptions were inappropriate while in the study group only 3 % of the prescriptions found to be inappropriate (Total score < 60%).

Mann-Whitney test it showed that mean sum of rank in study group was increased as compared to control group .The difference between two groups was statistically significant (Z =-15.375 and P value 0.000).

Prescribers (interns) guidance to the patient has improved significantly in the study group in the form of administration of the drug, follow-up, investigations or procedures, availability of drugs at UHC, diagnosis as compared to the control group and the difference was statistically significant as seen in table:6(A) and (B).

DISCUSSION

It is likely that prescribing habits are first formed in the intern year and that methods learned may determine a doctor's approach to prescribing in subsequent medical life There is, however, little empirical research on the scope of intern responsibilities with respect to prescribing, the way in which interns acquire these skills or the determinants of their practice.⁸

Table1: Prescribing problems			
Prescribing indicator		Control Group	Study Group
Average number of medicine prescribed per patient encounter		3.08±1.031	3.32±1.2
Percentage of drugs prescribed by generic name per prescription	0-75	121(52.6%)	53(23.0%)
	75-90	10(4.3%)	25(10.9%)
	90-100	99(43.0%)	152(66.1%)
Percentage of drug prescribed from essential drug list per prescription	0-75	181(78.7%)	137(59.6%)
	75-90	4(1.7%)	14(6.1%)
	90-100	45(19.6%)	79(34.3%)
Percentage of injectable prescribed		2(0.8%)	3(1.3%)
No. of drug combination prescribed per prescription		125(59%)	85(37%)

Table 2: Legibility of the prescriptions

Study	Control Group	Study Group	
Legibility of prescription			
More than one aspect(drug name/dose/duration/frequency) not clear	0(0%)	0(0%)	
One aspect (drug name /dose/duration/frequency)not clear	1(0.4%)	0(0%)	p value =0.06
Clear, but took effort to interpret	10(4.3%)	5(2.1%)	
No problem in reading all aspect of prescription +very clear immediately	219(95.2%)	225(97.8%)	
Clarity of Dose of prescription			
Either criteria not met for more than one medicine	0(0%)	0(0%)	
Either criteria not met for at least one medicine	2(0.9%)	0(0%)	p value =0.045
Clear, but took effort to interpret	10(4.3%)	5(2.2%)	
Clear dose stated for all medicines(Strength of dose+ Total daily dosage)	218(94.8%)	225(97.8%)	
Clarity of instruction of prescription			
Instruction for more than one medicines not clear	0(00%)	0(00%)	
Instruction for at least one medicine not clear	1(0.4%)	0(0%)	p value =0.041
Took effort to interpret	10(4.3%)	5(2.2%)	
Very clear immediately	219(95.2%)	225(97.8%)	

While the main objective of this study was to draw the inference on the use of the drugs and pattern of the prescription by these health providers (interns), no professional or moral judgment on the part of the individual intern was intended.

The increase in average number of drugs per prescription in study group as compared to control group can be ascribed to increase in number of prescription containing CVS/Antihypertensive drugs which many times requires more than one drug per prescription. Although polypharmacy, it is justified in certain complex medical diseases such as cardiovascular disease and mental disorders and is perhaps inevitable in an elderly population often with multiple chronic diseases.⁹

The number of drugs prescribed per patient ranged from one to seven. The average number of drugs prescribed per prescription was found to be 3.2 ± 1.106 (3.08 in the control group and 3.32 in the study group).

These finding were similar to study carried out by R. R. Pati (2004)¹⁰ prescribing pattern of medical interns at rural health centers Karnataka and found out that the number of drugs prescribed per patient ranged from zero to seven with a mean of 2.76 ± 1.29 .

Kshirsagar, et al⁷ had done study on medical practitioners and found out that the average number of drugs per prescription being 2.81 ± 1.22

One third of the prescriptions (75.2%) were containing at least three or more than three medicines relatively more than the study carried out by Patel et al¹¹ in prescription survey from Goa in which more than one half of the prescriptions (52.4%) were containing at least three or more than three medicines and a study carried out by Kshirsagar, et.al⁷ on medical practitioners in which the prescriptions containing three or more than three medicines was found to be 52.8%.The difference could because these studies were conducted on practitioners which generally are more experienced than interns in prescribing skills.

Table 3: Correctness of the prescriptions			
Format of prescription	Control Group	Study Group	
<u>SUPERSSCRIPTION</u>			
Yes	215(93.5%)	229(99.6%)	p value =0.0004
No	15(6.5%)	1(0.4%)	
<u>Order of prescription</u>			
Correct	178(77.4%)	210(77.4%)	p value =0.0001
Incorrect	52(22.6%)	20(22.6%)	
<u>Dosage form written</u>			
Yes	216(93.9%)	227(98.7%)	p value =0.035
No	14(6.1%)	3(1.3%)	
<u>INSCRIPTION</u>			
<u>Dose strength written (Scale)</u>			
Dose strength not written for any medications	201(87.4%)	22(9.6%)	p value <0.001
Dose strength written for less than 50% of medications	19(8.3%)	74(32.2%)	
Dose strength written for more than 50% of medication	6(2.6%)	67(29.1%)	
Dose strength written for all medication	4(1.7%)	67(29.1%)	
<u>Frequency correctly written</u>			
Yes	194(84.3%)	218(94.8%)	p value =0.0002
No	36(15.7%)	12(5.2%)	
<u>Duration of administration of drug written and correct</u>			
Yes	191(83.0%)	218(94.8%)	p value <0.001
No	39(17.0%)	12(5.2%)	

The percentage of drugs prescribed by generic name (more than 90% Percentage of drugs in each prescription) has increased as 66.1% in study group as compared to from 43% in control group. Mann-Whitney test showed this difference as significant.

Rehan HS¹² study on interns showed that the proportion of drugs prescribed by generic name was 49.5%. These is significantly higher as compared to a study carried out by R. R. Pati¹⁰ in which (16%) were prescribed using their generic names In another study carried out by Kshirsagar, et al⁷ on prescribing behaviour of medical practitioners generic drugs percentage ranged from 3% to 20.

Total 1473 drugs were prescribed out of which 994 were from essential drug list (67.48%) from both study and control group. Similar results were obtained in the study carried out by Bharti SS, et al¹³ 'prescribing practices' in the Primary Health Care facilities of Madhya Pradesh in which drugs prescribed from Essential Drug List were 66.9%.

The percentage of injectable prescribed was very less (2.1% from both study and control group) because urban health centre under present study had provision of injectable only for immunisation in OPD services.

These results are similar to study of Rehan HS¹² on drug prescribing pattern of interns in which the use of injectable was uncommon (0.9%) and another study carried out in Mumbai by Sunil Karande, et al¹⁴ where percentage of injectable prescribed was 0.2%.

The percentage of drug combination prescribed has reduced from 54.4% in the control group to 37% in the study group. Mann-Whitney test showed this difference as significant. This decrease in percentage of drug combination prescribed can be attributed to the decrease in the unnecessary use of antimicrobials, vitamins, cough preparations which are the most common form of drug combination prescribed in the health centre under study.

Table 4: Instructions to the pharmacist			
Format of prescription	Control Group	Study Group	
Duration of administration written and correct			
Yes	191(83.0%)	218(94.8%)	p value <0.001
Subscription			
Instruction to Pharmacist written			
Yes	3(1.3%)	1.4	
No	227(98.7%)	229(99.6%)	
Transcription or Signa			
Instruction to patient written			
Yes	169(73.5%)	229(99.6%)	p value <0.001
No	61(26.5%)	1(0.4%)	
Prescribes identity			
Signature Present			
Yes	122(53.0)	206(89.6%)	p value <0.001
No	108(47.0%)	24(10.4%)	
Indicator			
Average cost per prescription	27.17 Rupees	20.98 Rupees	p value =0.002

The average cost per prescription from both the study and control worked out to be 24.07 which was much less as compared to studies done in other parts of India like by Hema Chandra¹⁵ in U.P. in which cost per prescription worked out to be Rs. 123.75. The decrease in cost can be attributed to decrease use of antimicrobials, vitamins/minerals, cough preparations in the study group as compared to control group.

The legible prescription were found to be 96.5% from both study and control group in the present study and these results can be compared with results of Manoj Kumar, et al⁷ legibility of the prescription was found to be 78%. In both the studies same four point rating scale was used to assess legibility of the prescription.

The clarity of dose of prescription was found to be 96.3% from both study and control group in the present study while Patel V¹¹ in his study on public health care settings found out that 52.4% of the prescriptions having clearly stated dose on them. Results of both the studies are here may be different because method for assessing clarity of dose of prescription the of the prescription was different.

The prescriptions containing superscription was found in 96.5% from both study and control group in the present study and in a study done by Manoj kumar, et al⁷ the superscription (only Rx) was found in 87.5% of the prescriptions in remaining prescription were containing adv. 13.5% in place of Rx.

In the present study 48.7% of the prescriptions from both the study and control group were not having dose strength written for any medications on them. In Manoj kumar et al,⁷ study dose strength was missing in 41% of prescription from general practitioners and 10.27% of prescriptions from private practitioners.

The instructions to patients were found in about 86.55% of the prescriptions in the present study from both the study and control group. These results are similar with the study done by Pushpender Sharma, et al¹⁶ in Jammu city on qualified medical graduate and postgraduate doctors in which 68% of the prescriptions were found to be containing instructions to the patients.

Signature was present in about 71.3% of the prescriptions from both the study and control group. The results can be compared to study carried out by Patel V¹¹ on private and public health practitioners in which signature was present in 93.6% of the prescriptions. The higher results obtained in the study may be because practitioners are more experienced than interns and are mostly are aware of the medico legal importance of the signature.

Out of the 460 prescriptions collected from both the study and control group 21.75% of the prescriptions were found to be appropriate after applying appropriate prescription scale.

Table 5: Cost per Prescription			
Total score in percentage	Control Group	Study Group	
Range	1-191 Rupees	1-147 Rupees	
<u>Appropriate prescription</u>			
0-60	31.7	3.0	p value <0.001
60-80	66.1	55.7	
80-100	2.2	41.3	
<u>Information regarding present prescription</u>			
Do you know how to take medicines from this prescription?			
Yes	180(85.33%)	195(89.4%)	P value=0.185
NO	1(14.7%)	23(10.6%)	
Patient's knowledge regarding administration of drugs was correct?			
Yes	166(92.2%)	187(95.89%)	p value =0.115
NO	14(7.8%)	31(4.11%)	
Whether your doctor guided you about administration of these drugs?			
Yes	111(52.6%)	144(66.1%)	P value=0.0032
NO	100(47.4%)	74(33.9%)	
Have you been guided about your follow-up?			
Yes	38(18.0%)	90(41.3%)	p value <0.001
NO	173(82.0%)	128(58.7%)	
Have you been guided about any investigations or procedures?			
Response			
Yes	30(45.45%)	42(56.0%)	p-value=0.074
NO	36(54.54%)	33(44.0%)	

Manoj kumar, et al.⁷ found out in his study the percentage of appropriate prescriptions as among 62% of government doctors prescriptions and 49% of private practitioners. The difference here can be attributed to that the prescriptions in this study were evaluated using different scale and that the practitioners are more experienced than interns.

CONCLUSIONS

Format of the prescription also improved to significantly in the study group as compared to control group in the form of clarity of dose, clarity of instruction, superscription, order of prescription, dosage form and strength correctly written, frequency and duration of administration of the drug,

instruction to the patient and signature of the prescriber. Complementary drug use Indicators like average cost per prescription has also reduced in the study group as compared to control group.

Prescribers (interns) guidance to the patient has improved significantly in the study group in the form of administration of the drug, follow-up, investigations or procedures, availability of drugs at UHC, diagnosis as compared to the control group.

Therefore, it can be inferred that intervention in the form of structured training on pharmacotherapy to improve prescribing skills may have played role in these

Table 6(A): Patient's knowledge regarding prescription			
Total score in	percentage	Control Group	Study Group
Information regarding present prescription Do you know how to take medicines from this prescription?			
Yes		180 (85.3%)	195(89.4%)
NO		31 (14.7%)	23(10.6%)
			P value =0.185
Patient's knowledge regarding administration of drugs was correct?			
Yes		166(92.2%)	187(95.89%)
NO		14(7.8%)	31(4.11%)
			P value =0.115
Whether your doctor guided you about administration of these drugs?			
Yes		111(52.6%)	144(66.17%)
NO		100(47.4%)	4(33.9%)
			P value =0.0032
Have you been guided about your follow-up?			
Yes		38(18.01%)	90(41.3%)
NO		73(82.0%)	128(58.7%)
			P value <0.001
Have you been guided about any investigations or procedures?			
Response			
Yes		30(45.45%)	42(56.0%)
NO		36(54.54%)	33(44.0%)
			p-value =0.074

Table 6 (B): Patient's knowledge regarding prescription			
Format of prescription		Control Group	Study Group
Have you been informed about your diagnosis?			
Yes		38(18.01%)	110(50.5%)
No		73(82.0%)	108(49.5%)
			p-value< 0.0001
Have you been satisfied with time spent by doctor with you?			
Yes		195(92.4%)	212(97.2%)
No		16(7.6%)	6(2.8%)
			p-value =0.023

improvements along with other contributory factors. The other contributory factors being knowledge sharing among the interns, knowledge transfer from RMOs, faculty, previous experience in other postings etc.

It can be recommended that structured training on pharmacotherapy based on workshop pattern with focus on problem solving exercises can be helpful to improve prescribing skills of interns and may be introduced in regular internship orientation programme in addition to other routine orientation on prescribing skills.

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