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Research Article

Evaluation of a skill-based training program for interns on prescription self-audit

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Abstract

Context: Good prescription practices are needed to ensure rational drug use. Does training of interns on prescription self-audit improve the quality of prescriptions?
Aim: to evaluate a skilled based training program for interns on self-audit of their prescription practices.
Methods and Material: An interventional workshop on prescription self-audit was conducted for interns. In the workshop, 25 interns replicated 10 random prescriptions written by them during their Compulsory Rotatory Residential Internship (CRRI) (Cycle 1= C1). Then, the interns were trained to audit these prescriptions using WHO core prescribing indicators and interpret the results. They were asked to identify the lacunae in their prescriptions that required improvement. The same process was repeated after 2 weeks (Cycle 2= C2). C1 and C2 prescription parameters were compared to assess the effectiveness of the training. Perceptions of the interns were assessed using Likert's scale.
Results: The mean drugs per prescription reduced from 3.19±0.9 in C1 to 2.972±0.6 in C2. The percentage of antibiotics in C1 and C2 were 42.4% and 60%, and injections were 60.4% and 48% respectively. In terms of polypharmacy, use of injectables and antibiotics, values obtained were higher than the acceptable range set by WHO. The drugs prescribed by generic name in C1 and C2 were 37.6 % and 68.4 % and the improvement was statistically significant.
Conclusions: There was an improvement in the prescribing practices of interns with sequential self-audit. There is a perceived gap regarding rational drug use which may be bridged by further training.
Keywords: prescribing indicators, CRRI, rational prescribing, polypharmacy, drug use indicators, CBME (Competency Based Medical Education).

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1. Introduction

Prescription is the written order of a physician which contains information pertaining to the dose, route and frequency of administration of the drug. Prescription is rational when the prescriber is in possession of all the necessary knowledge, understanding and skill.[1] Lack of proper training, time constraints, lack of precision of the knowledge and the attempt to hide latter can be the reasons for the bad prescription practices.[2]

In the undergraduate medical curriculum, pharmacology is taught traditionally with a drug-centered approach in second year. After a time gap of three years, graduates are supposed to prescribe during internship with a more disease or symptom focused approach. [3]

Irrational prescribing practices are very common among medical interns and it may carry forward despite the gain in clinical experience. [4] Since interns are our future generation of doctors, there should be a focus on reinforcing this core skill by properly training them at the earliest. [5] Although computerized prescriptions can reduce errors, it is still a luxury for many prescribers. [6]

With an aim to inculcate good prescription practices among doctors, WHO has put forward suggestions to audit prescriptions using core prescribing indicators.[7,8] There were many studies or external audits done on prescription pattern of interns and doctors but none of them gives a direct customized feedback to prescribers about their shortcomings and where the focus is needed.[9,10]

With this background, the present study was done to evaluate a skill-based training program for medical interns on prescription self-audit using WHO core prescribing indicators. [7,8]

1.1 Aim

To evaluate a skill-based training program for interns on prescription self-audit.

1.2 Objectives

Primary objective was to measure the change in the prescription pattern of the interns after the intervention. Other objectives were to identify the prescription indicators that needed improvement and to assess the perception of interns regarding the training program.

2. Subjects and Methods

The study was initiated after obtaining ethical clearance from the Institutional Research Board (IRB) and institutional ethical committee (IEC). A prescription self-audit workshop of 2 hours duration was organized at the department of pharmacology for interns after obtaining permission from the Dean of the Institution and HODs of concerned clinical departments.

Prescriptions of interns was collected and analyzed in two phases as cycle 1(C1) and 2(C2). Cycle 1 prescription audit was done during the workshop. Cycle 2 prescriptions and self-audit was done 2 weeks after the workshop. The study was of one month duration conducted in the month of September 2019.

Interns who did the cycle 1 and cycle 2 sessions of prescription self-audit were included in the study. Interns who couldn't complete C2 session conducted after 2 weeks were excluded.

In the workshop, interns were asked to replicate 10 random prescriptions (C1) written by them during their CRRI. Then there was a twenty-minute Power Point aided training session on good prescription practices and WHO core prescribing indicators.[7,8] After that, the interns were trained to audit their prescriptions with WHO core prescribing indicators (Table 1) using proforma and interpret the results. In the proforma, interns were asked to analyze their prescriptions after assigning scores for each of the first fifteen items (Table 1). For items 16-19 (Table 1), average was calculated. Interns were asked to identify any lacunae in their prescribing behavior that needed improvement.

Table 1: WHO Prescribing indicators [3,4]

Fist 14 items, scores were assigned (*Score 1: if present, score 0: if absent)		
Items	**Score**	
1. Name of Prescriber	1	0
2. Address of Prescriber	Present	Absent
3. Date	Present	Absent
4. Signature/initials	Present	Absent
5. Name of Patient	Present	Absent
6. Address of Patient	Present	Absent
7. Age of Patient?	Present	Absent
8. Name of drug - (Generic name used or not)	Present	Absent
9. Strength of drug	Present	Absent
10. Dosage -How much?	Present	Absent
11. Dosage -How many times a day?	Present	Absent
12. Dosage -How many days?	Present	Absent
13. Other Instruction (e.g.; after meals)	Present	Absent
14. Total number/ amount of tablets or syrup; pharmacy to dispense	Present	Absent
I5. Legibility (scale of 0 to 2) 0 - Illegible	1- just legible	2 Perfect
For items 16-19: average was calculated		
16. Number of drug items on prescription 17. Number of combination drugs on prescription		
18. Number of antibiotics on prescription		
19. Total member of injections prescribed on this prescription (1 a day for 5 days is 5 injections)		

After a gap of 2 weeks, interns who attended the workshop were called again to the department of Pharmacology. They were asked to write 10 more random prescriptions and audit them same way using WHO core prescribing indicators with proforma. They were asked to assess any change in their prescription practices in Cycle 2 as compared to cycle 1.

To assess the effectiveness of the training on prescription self-audit, results of cycle 1 and 2 prescriptions of interns were compared. Perception of interns regarding training was assessed with a peer validated self-administered questionnaire in Likert's scale scoring using Google survey forms. An external audit was done on cycle 1and 2 prescriptions to ensure compliance of interns in following the given instructions.

2.1 Statistical methods

To compare prescription parameters of C1 and C2 prescriptions, assuming normality of data, paired T test was used for continuous parameters. Mann- Whitney U test was used for skewed data and Chi- square test for frequencies using SPSS 20 (Trial version). All reported p values were two sided (a=0.05) and p value ≤ 0.05 was considered significant.

3. Results

Out of 66 interns in our institution, 29 interns attended the prescription self-audit workshop. Out of this, only 25 completed the study requisites and were included in the study. Each intern had written 10 prescriptions in each cycle amounting to 500 prescriptions together for both C1 and C2.

Their C1 and C2 prescriptions were compared using WHO prescription indicators [7,8] (Annexure 1, Table 1). Results are given under following headings

1. Prescriber and Patient parameters (Table 2)
2. Drug parameters (Table 3)
3. Secondary core drug use indicators (Table 4)
4. Legibility (Figure 1 and 2)
5. Perception of interns about prescription self-audit training (Figure 3)

Table 2: Patient and prescriber parameters

Core prescription indicators Patient and Prescriber parameters	Total no off prescription N = 250 (%)		P value
	C1	C2	
Name of Prescriber	178 (71.2)	250 (100) *	0.003
Address of prescriber	81 (32.4)	240 (96) *	< 0.05
Date	189 (75.6)	250 (100) *	0.01
Signature	250 (100)	250 (100)	-
Name of Patient	222 (88.8)	250 (100)	0.07
Address of patient	107 (42.8)	250 (100) *	< 0.05
Age of the patient	199 (79.6)	239 (95.6)	0.06

Table 3: Drug parameters

Core prescription indicators Drug parameters	Total no off prescription N = 250 (%)		P value
	C1	C2	
Name of Drug – generic	138 (55.2)	238 (95.2)*	0.001
Strength of drug	137 (54.8)	230 (92)*	0.006
Dosage- how much	235 (94)	247 (98.8)	0.14
Dosage- How many times a day	240 (96)	250 (100)	0.17
Dosage- How many days	234 (93.6)	250 (100)	0.13
Other instruction	59 (23.6)	244 (97.6)*	<0.05

Table 4: Secondary drug parameters

Core prescription indicators Secondary Drug parameters	Total (N=250)		Average/prescription		P value
	C1	C2	C1	C2	
Number of drug items	797	743	3.19 ± 0.92	2.97 ± 0.56	0.2
Number of combination drugs	160	126	0.64 ± 0.31	0.50 ± 0.29*	0.04
Number of antibiotics	106	115	0.41 ± 0.02	0.46 ± 0.27#	0.86
Total number of injections	409	349	1.64 ± 1.89	1.39 ± 1.65#	0.1
Number of drugs in brand name	497	235	1.98 ± 0.99	0.94 ± 0.88#*	0.01
Number of drugs in generic name	300	508	1.20 ± 0.97	2.03 ± 0.82 #*	0.02

* Statistically significant, #Skewed data, p value using Mann Whitney test

Figure 1: Average legibility score/ prescription

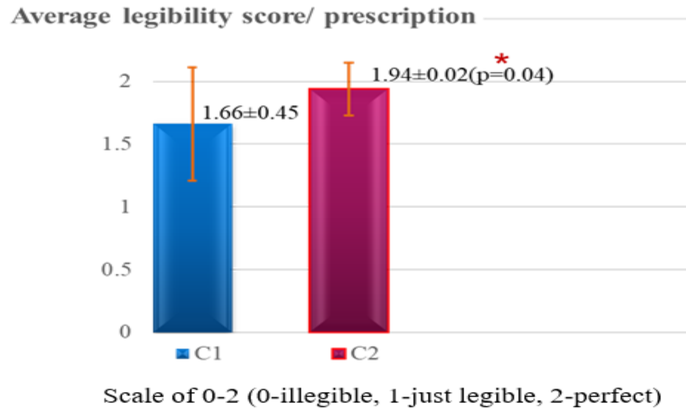
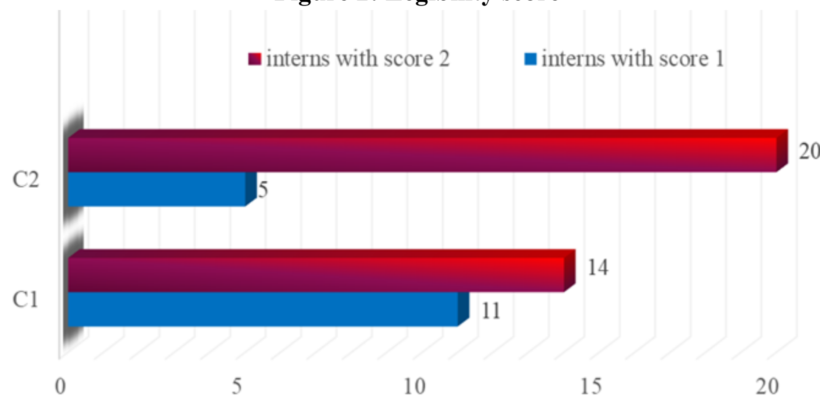


Figure 2: Legibility score



Majority of the prescriptions lacked name and address of both prescriber and patient which improved significantly on second prescription. All prescriptions carried the signature of interns. 32.4% prescriptions had institutional address. (Table 2)

In C1, only 55.2% of prescription had all the drug items written in generic name (Table 3).

Each prescription contained an average of 3 drugs. Nearly every 3 prescriptions had an antibiotic. Every 2 prescriptions had at least 3 injections (Table 4). Each prescription had an average of 2 drugs written in brand name, the ratio reduced on sequential audit. (Table 4) 14 interns had perfect legibility score in C1, which further improved in C2 (Figure 1 and 2).

4. Discussion

An audit comprises the review and the evaluation of the health care procedures and documentation for the purpose of comparing the quality of care which is provided, with the accepted standards.[11] Many external or peer review studies were conducted for evaluating the prescribing practice among practitioners and reasons for their prescriptions.[10,11] Prescription audit seeks to monitor, evaluate and if necessary, suggest modifications in the prescribing practices of medical practitioners.[12] Audit is of value only if it leads to rational prescribing and improved clinical care.[13] It is questionable whether the outcomes of these studies reach the prescribers and change their practice.[14] The use of medical self-audit to improve clinical care has been widely suggested for general practitioners to improve the quality of their clinical care.[14,15] Reflection and proactive learning in evidence based medicine after audit analysis and reinforcement by documenting the change in prescription behavior is necessary for rational prescription. When prescription is evidence based and tailored for each patient, there is high likelihood for the patient to obtain benefit than being harmed.

A self-appraisal/ self-audit is a method that allows evaluation of one's own strengths and weaknesses in a specific task. Through self-audit, doctors can enhance their work performance. It is important to encourage doctors to monitor their own performance and to discover their own bad habits rather than impose restrictions by outside bodies which will probably not have the desired effect. Self-appraisal stimulates self-examination. It not just permits us to dive in our general knowledge but also leads us to question individual aspects of ourselves. Self-audit by the doctor coupled with education will optimize clinical care by producing more appropriate therapeutic intervention.[15]

This study was undertaken to evaluate the effectiveness of a skill-based training program for interns on prescription self-audit. Thereby, this study intends to help them identify the lacunae in their prescription skills and improve their prescription for better patient centered management.

Several studies had suggested the relevance of audit in improving patient care.[9-10,16-18] Accordingly, comparing the current usage of drugs with the standard treatment guidelines will enhance the effectiveness of treatment and render it cost-effective.[17] A prescription self-audit study of 34 doctors using the practice activity analysis method, which showed subsequent reductions in number of drugs prescribed.[16]

An interventional study conducted in interns by Venkatesan *et al* depicted that prescription errors reduced following training on rational drug prescription.[2] In a self-audit study by Sheldon, more appropriate prescribing happened once he continuously audited his own prescriptions.[15] There was a reduction in the number of drugs prescribed as well as the number of follow ups needed before resolution of the problem.[15]

Regarding prescription audits there is a gap in literature availability. [10,15-17] It may be due to computerization of medical records which nullified legibility and dosage issues.[6] In contrast to this, prescription audits are gaining importance nowadays due to medication errors and emerging antibiotic resistance.[2]

Adherence to good prescribing guidelines can lead to rational prescription. Keeping this as a goal, we used WHO core prescription parameters (Table 1) to train interns to audit their prescriptions. [7,8,19]

In cycle 1 audit, prescriptions of many interns were incomplete, regarding patient and prescriber details except signature. (Table 2) 80 % of justification by interns for not entering the patient and prescriber address was that it was printed in the case sheet. All of them were in an opinion of rectifying these mistakes wherever necessary and agreed to ensure patient OP number, name, and age in all sheets of case files. This was rectified in C2 by the interns.

Regarding drug dosage parameters, strong recommendations were made by WHO [15] such as

• Use generic name to avoid bias, malpractice and to cut down the cost borne by the patient.

• Use of trade name is advised, only when it is justifiable, and it should always be followed by 'Do not substitute' or 'Dispense as written' instruction.

WHO recommended the number of medicines per prescription as 1.4 to 1.8, antibiotics percentage as 20% to 27%, and injectable medicines as 13.4% to 24.1%, whereas the standard accepted value for generic prescription as 100%.[19] Based on these recommended values, interns were asked to evaluate their drug-prescribing pattern.

4.1 Prescribing by generic name

Writing prescriptions using the generic name is important to avoid undesirable drug interactions, adverse drug reactions, and medication errors.[17] 138 prescriptions out of 250 (55.2%) (Table 3) had all drugs in generic names. Out of 797 drug items prescribed, only 300 items were written in generic names (Table 4). This area of concern in prescription pattern was agreed to be rectified by interns, which improved on subsequent audit (C2).

Since some of the brand names, for example like AVIL, EMSET, CITRALKA is so rooted in our practice, interns expressed their concern of whether generic names were required everywhere. To them some of the commonly used generic names, for example prochlorperazine (STEMETIL) and Promethazine (PHENERGAN) are more confusing than their brand names. Even some nursing staff are not aware of these generic names in practice. In spite of these concerns, there was a significant decrease in branded drugs in C2 prescriptions (Table 4).

Although medical undergraduates are instructed to write generic drug names, prescribing in clinical set up frequently utilizes brand names. There are many reasons for this. Pharmacies other than government- run hospitals hardly stock unbranded generic drugs. When a prescription is received for an unbranded generic drug it is likely that the pharmacist would dispense their favorite branded generic instead. Even when unbranded generics are available there are apprehensions among the prescribers regarding the efficacy and safety of generics. There are concerns that prescribing using generic name could only avoid dispensing errors arising due to similar brand names.[20] In an Australian study among junior doctors, no participant was able to identify and provide the generic name, class or mode of action for commonly prescribed drugs from their brand names.[21] This study suggests mandate prescribing using generic names of drugs in hospitals.[21]

4.2 Level of polypharmacy

Each prescription contained an average of 3 drugs (table 4) which is higher than the ideal value.[19] Whenever patients are exposed to multiple drugs, the incidence of drug interactions and adverse drug reactions increases.[22]Thus, prescriptions with many drugs may be an indicator of inappropriate prescribing.

Polypharmacy is commonly defined as the concurrent use of ≥5 drugs by an individual patient, regardless of the indications for which they have been prescribed.[23] It will be ideal if junior doctors are sensitized to tools that help identify potentially inappropriate medication use include the Beers, STOPP (screening tool of

older people's prescriptions), and START (screening tool to alert to right treatment) criteria, and the Medication Appropriateness Index. Monitoring patient's active medication lists and deprescribing any unnecessary medications are advised to reduce pill burden, the risks of adverse drug events, and financial hardship.[24]

4.3 Prescription of injectable dosage forms and antibiotics

Nearly every prescription had an injection and every 3 prescriptions had an antibiotic (Table 4). Antibiotic and injections per prescription in both cycles were higher than the ideal value recommended by WHO.[19] Among injections given, antiemetic and antacid drugs topped the prescriptions. Despite the expectation of reduction in antibiotic prescriptions, the practice continued in C2. This could be due to the disease spectrum and severity chosen by interns for their simulated prescriptions in this study. Regardless of the reason, a need was identified to reduce the use of antibiotics and injections wherever possible.

Patient demand, vigorous marketing and lack of awareness are found to be responsible for irrational antibiotic prescription.[25,26] Antibiotic use has been linked to an increase in antimicrobial resistance, superinfections, allergic reactions, and health expenses.[26]

Antibiotic stewardship is important to effectively treat infections, prevent patients from adverse drug reactions caused by unnecessary antibiotic use, and combat antibiotic resistance.[27] In US, set a goal to cut down inappropriate outpatient antibiotic use to 50% by 2020.[28] In accordance to the various guidelines, [19,28] interns acknowledged the importance of rational and cost-effective medication use.

4.4 Legibility

Doctors are legally obliged to write clearly, to prevent medication errors by paramedical staff.[20] There was a significant improvement in Mean Legibility score. The number of interns with legibility score 2 were higher in C2. (Figure 1 & 2) The results of external audit done on both cycle 1 and 2 prescriptions of interns were almost identical except on legibility score. An interesting observation was 30% interns underscored another 20% over scored their legibility in prescriptions.

Other lacunas in C1 are instructions to pharmacist and patient regarding number of tablets or medicines to be dispensed, the strength of the drug for dispensing syrups and injections, were identified and rectified in the subsequent prescription.

4.5 Likert's scale

Perceptions of interns were recorded in 5-point Likert scale using Google forms. (Figure 3) Interns found this training useful. They recommended this training to be continued for their juniors. Most of the interns wanted further training on rational drug prescription.

Most of the doctors acquire their clinical competence and skills during internship training by observing and mimicking their teachers. Apart from maintaining a skill book to log their clinical activities during internship at various departments, there are no organized skill-based training programs for interns. They are basically on their own even though under the monitoring and liability of staff. Various studies had shown that if a skill-based training was given during internship, there is a greater impact among interns and it is useful in achieving excellence in patient management.[6,29] This study sheds light towards the perceived need by interns for their further skill-based training.

5. Recommendations

This study highlights the importance of training interns on self- audit for improving prescription writing. We emphasis the possible pivotal role of paraclinical departments in shaping the interns into a competent one. These departments can contribute to CRRI by organizing small skill-based workshops (post lunch sessions of duration 2-3 hours) that can fit into busy posting schedule of interns. Paraclinical departments can thereby collaborate with clinical departments to bridge the knowledge gap among interns.

6. Limitations

Initially the study was planned on real prescriptions of interns from case sheets. Because of time constraints and difficulty to pool all interns at once for workshop, training was done with simulated prescriptions. Therefore, drug prescribing pattern was not correlated with the disease pattern of the patients. Since the study was done in a reserved time for training, study results were not altered by the hectic schedule of interns and it cannot interpret the real prescriptions habits of busy interns.

7. Advantages

- More appropriate prescribing happened once interns sequentially audited their prescriptions.
- Struggle to write generic names waned with a repeated auditing on C2.
- Further need for training was identified.

8. Conclusion

In general, drug-prescribing practices of interns in regard to WHO core prescribing indicators have scope for further improvement. Particularly, the significant deviation from the acceptable WHO standard in prescribing antibiotics and injectable medications requires special focus. However, since drug prescribing pattern was not correlated with the

diagnosis (indication) and severity of illness, further studies are recommended to judge the rationality/irrationality in use of much antibiotics and injectable drugs, in a better way, especially in real setup.

Further audits and trainings are recommended to judge the rationality in use of antibiotics and injectable drugs, especially in real setup.

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