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Original Research Article

Impact of hands-on training of prescription writing on quality of prescription: a cross-sectional study

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ABSTRACT

Background: Prescription writing assessment is considered an important parameter to ensure rational drug use. Prescription errors can result from an individual as well as system-related factors. A systematic analysis of prescriptions can detect these errors through the prescription audit. Proper training can change the quality of prescription. This study aimed to determine the impact of such training on quality of prescription.
Methods: A cross-sectional study was conducted to assess the impact of training. Initially baseline data was collected of all prescriptions prescribed at rural health training center in terms of completeness and quality writing of prescription. This data collection was followed by hands-on training of interns and repeat audit was with prescription of subsequent quarters. To assess the impact of training on prescription writing practices, training session organized for the inters posted at the RHTC.
Results: Improvement was evident in both parameters of prescription writing, completeness of writing as well as quality of prescription. Few striking points of prescription completeness like writing down systemic examination ($p<0.00001$, $Z=-18.814$) and mentioning patient's allergy status ($p<0.00001$, $Z=-6.125$). Improvement also seen in quality of prescription like writing generic name of drugs ($p<0.00001$, $Z=-11.123$) and handwriting ($p<0.00001$, $Z=-6.022$).
Conclusions: Regular training to the staff about the prescription writing may help to overcome irrational prescribing of the drugs and antibiotics.

Keywords: Drug prescription, Quality improvement, Training

INTRODUCTION

Prescription writing assessment is considered an important parameter to ensure rational drug use. Rational use of drugs is essential to achieve good quality health care for patients as well as for the community. It ensures that patients are advised medications which are appropriate for their clinical needs and in doses that suits each patient's individual requirements and that they are prescribed for adequate period with minimum cost to patients and the community. Irrational prescription may lead to ineffective treatment, which may subject the patient to prolongation or exacerbation of illness, unnecessary mental distress, untoward side effects and higher expenses.[1]

According to National Institute of Clinical Excellence (NICE) "a prescription audit is part of the holistic clinical audit and, it is a quality improvement process that seeks to improve patient care and outcomes through a systematic review of care against explicit criteria and the implementation of change".[2]

Prescription errors can stem from both individual mistakes and systemic issues within healthcare settings. These errors range from simple lapses like incorrect

dosages or illegible prescriptions to more serious mistakes such as prescribing the wrong medication altogether. Patients can also inadvertently contribute to errors by not disclosing allergies or failing to adhere to prescribed instructions.

Detecting these errors is paramount to establishing safer healthcare systems and preventing adverse events. Conducting systematic analyses of prescriptions through audits allows for the identification of recurring errors and areas for improvement. Once these opportunities are pinpointed, it becomes essential to prioritize them based on their potential impact, establish clear timelines for corrective actions, and implement targeted strategies to reduce the occurrence of prescription errors.

A study done by Bates et al to assess adverse medicine events, found that 28% of adverse medicine events were preventable. The study concluded that 56% of such preventable adverse events occurred at the stage of prescription writing.[3]

Banerjee et al conducted a study in primary health center attached to a medical college in India in which it was found that only 34.97% drugs were prescribed by generic name, while the percentage of drugs prescribed from essential drug list of India was 58.47%. Study shows that irrational prescribing practices are common among interns of the institute.[4]

Gopalakrishnan et al in their study found that percentage of prescriptions with an antibiotic was 55% and nearly 62% of the practitioner's prescribed drugs by their generic names. As a practice of poly- pharmacy, it was observed that the average number of drugs prescribed in urban and rural area was nearly 5 and 4, respectively.[5]

A systematic review conducted by Sulis et al, found that proportion of antibiotic prescribing was 52% (95% CI: 51-53%). The findings highlighted the need for urgent action to improve prescription practices, need the integration of WHO treatment recommendations.[6] Joshi et, al. conducted a multicentric study among 4838 prescriptions, polypharmacy was noted in 83.05% of prescriptions and 38.65% of the prescriptions were incomplete due to multiple omissions such as dose, duration, and formulation.[7]

Medication errors are probably the most prevalent form of medical error, and prescribing errors are the most important source of medication errors. Interventions are needed at three levels to improve prescribing. First improve the training, and test the competence, of prescribers, second control the environment in which prescribers perform in order to standardize it, have greater controls on riskier drugs, and use technology to provide decision support and third change organizational cultures, which do not support the belief that prescribing is a complex, technical act, and that it is important to get it right. Solutions involve overt acknowledgement of this by senior clinicians and managers, and an open process of sharing and reviewing prescribing decisions.[8]

With increasing antimicrobial resistance and irrational prescription writing leading to serious consequences, and with reference to above mentioned literature review, need was felt to evaluate current practices of prescription writing in field practice area of Parul Institute of Medical Sciences & Research (PIMSR). As rural health training centre (RHTC) is directly linked with community, this center was chosen to assess quality of prescription.

Objective

To evaluate current practices of prescription writing among the interns posted at the RHTC Waghodia. To assess the impact of training to the interns on quality of prescription.

METHODS

This study conducted at RHTC Waghodia, situated in the rural Vadodara district and serving a population of around 15,000 of nearby 6 villages. The RHTC operates a general and specialist OPD, where interns manage OPD under supervision of public health specialist.

To evaluate prescription writing practices we followed guidelines given by Ministry of Health and Family Welfare, GOI. This was 27-point checklist which included components related to completeness of prescription, as well as quality of prescriptions. Data was collected using census method, including all prescribed prescription. For baseline data, prescriptions from August to October 2023 were assessed. This baseline data recorded in Microsoft Excel and frequency analysis was done using SPSS version 25. The findings from this initial audit served as a baseline against which the effectiveness of subsequent interventions could be measured.

Subsequently, a structured training program was implemented for interns, commencing on their first day of posting RHTC and continuing for a duration of three months. The training aimed to enhance prescription practices and improve completeness and quality of the prescriptions.

In April 2024, a follow-up prescription audit was conducted, in which prescriptions written from January to March 2024 was taken for audit. No ethical issues were there as it was a simple training session of interns and no any patient involvement. Collected data were entered in Microsoft excel and analyzed using SPSS version 25. Descriptive analysis followed by Univariate analysis was done. The impact of the training intervention was assessed using statistical method Z test to determine the significance of observed changes in prescription quality and completeness after the training.

RESULTS

After doing the frequency analysis of prescriptions of August 2023 to September 2023, we found results about completeness and quality of prescription as shown below. Out of 216 prescriptions audited, basic details like allergy status were mentioned in only 32 (14.8%) of prescriptions, only 8 (3.7%) prescription had followed up advices mentioned. Clinical examination was missing in nearly 31% of prescription and provisional diagnosis was missing in more than 50% of prescription.

However, details like OPD registration number, complete name of the patient, date of consultation and gender were mentioned in majority of the prescriptions. Also, 94.7% prescription had treatment as per standard treatment guideline (STG). Polypharmacy was absent in 95% of prescriptions.

Table 1: Distribution of interns according to gender.

Gender	Frequency
Female	7
Male	5

Total 12 interns involved into the study as 2 interns posted every month. Among them 7 were females and 5 were males as per displayed in Table 1.

Table 2: Univariate analysis of two prescription audits to assess improvement in prescription writing.

Variables	Response	Old value N (%)	New value N (%)	p value (Z score)
Is OPD registration number mentioned?	Yes	118 (92.9)	216 (100)	0.00092a (-3.115)
	No	9 (7.1)	0 (0)	
Is complete name of the patient is written?	Yes	73 (57.5)	212 (98.1)	<0.00001a (-9.054)
	No	54 (42.5)	4 (1.9)	
Is age in years/ months mentioned?	Yes	121(95.3)	209 (96.8)	0.250474 (-0.673)
	No	6 (4.7)	7 (3.2)	
Is weight in kg mentioned? (only patients of paediatric age group)	Yes	1 (6.3)	2 (6.3)	0.5 (0)
	No	15 (93.7)	30 (93.8)	
Is date of consultation - day / month / year mentioned?	Yes	127 (100)	215 (99.5)	0.148752 (-1.041)
	No	0 (0)	1 (0.5)	
Is gender of the patient mentioned?	Yes	127 (100)	216 (100)	-
	No	0 (0)	0 (0)	
Is brief history written?	Yes	99 (78)	215 (99.5)	<0.00001a (-5.799)
	No	28 (22)	1 (0.5)	
Is allergy status mentioned?	Yes	0 (0)	32 (14.8)	<0.00001a (-6.125)
	No	127 (100)	184 (85.2)	
Are salient features of clinical examination recorded?	Yes	4 (3.1)	149 (69)	<0.00001a (-18.814)
	No	123(96.9)	67 (31)	
Is presumptive / definitive diagnosis written?	Yes	9 (7.1)	102 (47.2)	<0.00001a (-9.803)
	No	118(92.9)	114 (52.8)	
Is medicine schedule / doses clearly written?	Yes	75 (59.1)	197 (94.3)	<0.00001a (-7.655)
	No	52 (39.9)	12 (5.7)	
Is duration of treatment written?	Yes	112(88.2)	204 (97.6)	<0.00001a (-2.971)
	No	15 (12.8)	5 (2.4)	
Is date of next visit written?	Yes	2 (1.6)	73 (34)	<0.00001a (-9.501)
	No	125(98.4)	142 (66)	
In case of referral, are the relevant clinical details and reason for referral given?	Yes	0 (0)	6 (75)	<0.00001a (-4.898)
	No	2 (100)	2 (25)	
Are follow-up advise and precautions (do's and don'ts) recorded?	Yes	0 (0)	8 (3.7)	0.001988a (-2.880)
	No	127 (100)	207 (96.3)	
Is prescription duly signed?	Yes	29 (22.8)	199 (92.1)	<0.00001a (-16.696)
	No	98 (77.2)	17 (7.9)	
Is handwriting legible in capital letter?	Yes	88 (69.3)	206 (95.4)	<0.00001a (-6.022)
	No	39 (30.7)	10 (4.6)	
Are medicines are prescribed by generic names?	Yes	22 (17.3)	144 (68.9)	<0.00001a (-11.123)
	No	105 (82.7)	65 (31.1)	

Continued.

Variables	Response	Old value N (%)	New value N (%)	p value (Z score)
Are medicines prescribed are in line with STG?	Yes	95 (74.8)	198 (94.7)	<0.00001a (-4.792)
	No	32 (25.2)	11 (5.3)	
Are medicines prescribed are as per EML?	Yes	125 (98.4)	207 (99)	0.323476 (-0.458)
	No	2 (1.6)	2 (1)	
Are medicines advised are available in the dispensary?	Yes	125 (98.4)	209 (100)	0.075359 (-1.437)
	No	2 (1.6)	0 (0)	
Are vitamins, tonics or enzymes prescribed?	Yes	39 (30.7)	41 (19.5)	0.011441a (-2.275)
	No	88 (69.3)	169 (80.5)	
Are antibiotics prescribed?	Yes	52 (40.9)	58 (27.8)	0.007185a (-2.447)
	No	75 (59.1)	151 (72.2)	
Are antibiotics prescribed as per facility's antibiotic policy?	Yes	38 (73.1)	53 (91.4)	0.00534a (-2.553)
	No	14 (26.9)	5 (8.6)	
Are investigations advised?	Yes	0 (0)	8 (3.7)	0.001988a (-2.880)
	No	127 (100)	208 (96.3)	
Are injections prescribed?	Yes	0 (0)	0 (0)	-
	No	127 (100)	216 (100)	
Is polypharmacy (> 5 drugs prescribed) present?	Yes	9 (7.1)	10 (5)	0.219968 (-0.772)
	No	118 (92.9)	206 (95)	

a- statically significant p value

Following the training sessions held for interns on their first day at the RHTC regarding the proper writing of valid prescriptions, notable improvements have been observed in prescription audit of January 2024 to March 2024 compared to the baseline audit from August to October 2023. As mentioned in Table 2 improvements were noted in parameters of completeness of the prescription like accurately recording OPD registration numbers from 92.9% to 100% (p=0.00092), complete patient names from 57.5% to 98.1% (p<0.00001), brief histories from 78% to 99.5% (p<0.00001), salient clinical examination features from 3.1% to 69% (p<0.00001), diagnoses from 7.1% to 47.2% (p<0.00001), medicine schedules and doses from 59.1% to 94.3% (p<0.00001), treatment durations from 88.2% to 97.6% (p<0.00001), reasons for referrals from 0% to 75% (p<0.00001), and ensuring prescriptions were signed from 22.8% to 92.1% (p<0.00001). However, there has been little change in consistently recording patient ages from 95.3% to 96.8%, dates of consultation 100% to 99.5%, and mentioning patient genders was 100% both the times.

Comparatively, in the quality parameters there has been progress in legible handwriting from 69.3% to 95.4% (p<0.00001) and the use of generic drug names from 17.3% to 68.9% (p<0.00001), though further improvements are still possible. Moreover, there have been strides in adhering to standard treatment guidelines (STD) and the essential medicine list (EML). There has been a decrease in the prescription of vitamins, tonics, and enzymes, from 30.7% to 19.5% indicating a more focused approach to medication (p=0.011441). Antibiotics were being prescribed less frequently from 40.9% to 27.8% (p=0.007185), but when they were, it's mostly in accordance with the facility's antibiotic policy in 91.4% as compared with the baseline which was 73.1% (p=0.00534), demonstrating better adherence to guidelines. There has been a slight decrease in polypharmacy practices from 7.1% to 5%, reflecting a more cautious approach to prescribing multiple medications simultaneously.

Table 2 shows improvement in prescription writing skill following to periodic training.

DISCUSSION

This study was conducted at the rural center of PIMSR, RHTC where inters prescribing the prescription under supervision of the public health specialist. As per need of proper prescription writing to control the polypharmacy and use of antibiotics irrationally, baseline audit conducted for the prescriptions of August 2023 to September 2023. Audit report shows that training was needed. So, training session started for the interns and repeat prescription audit was conducted for the prescriptions of the month January 2024 to March 2024 for assessing the effectiveness of the training session.

Since initiating training sessions for interns on prescription writing and drug advice, we've noted significant enhancements in prescription quality across various aspects. There have been notable improvements in nearly every evaluated parameter of prescription quality. However, the progress in completeness of prescriptions hasn't been as pronounced as improvements in overall quality.

We held only one session of training to the newly posted interns at their first day of the posting and by this we

found significant improvements. Like this Padmavathi Thenrajan in 2016 did prospective comparative study in control and test group of 25 students each. They gave the patient-based training to the test group and found the significant findings as we got in our study.[9]

We conducted the two cycles of the prescription audit first we done audit for getting the baseline data. Training session organized after getting the baseline data then second cycle of prescription audit was conducted and we found significant findings in many aspects of the quality and completeness of the prescriptions. This type of findings was also seen in cross-sectional study of Ahmed Mushood in the OPD of the District Head Quarters (DHQ) Hospital in Bhimber, Azad Jammu and Kashmir. He audits the randomly selected 100 prescriptions only in each cycle while we audit all the prescription during the time period. He also found the significant improvement in documenting the allergic status of the patients (62%) and the direction of drug administration (40%), mentioning patient's weight, writing down probable diagnosis after the education intervention.[10]

In our study we found that after proper training of the prescribing the antibiotics we can see more rational use of the antibiotic prescribing. As the training helps to cut down the irrational use of the antibiotics. Similarly, Lo in their study found that general practitioners (GPs) with the training of the postgraduate family medicine training was less likely to prescribe the antibiotics as compared to the GPs without the training of the postgraduate family medicine.[11]

The results of these audits and analyses provide valuable insights into the efficacy of the training program in improving prescription practices at RHTC Waghodia. By comparing pre- and post-intervention data, the study aims to contribute evidence-based recommendations for enhancing healthcare quality in rural settings, particularly concerning the management of outpatient prescriptions by interns.

Overall, the study underscores the importance of continuous training and evaluation in healthcare settings to ensure adherence to best practices and improve patient outcomes, especially in underserved rural populations like those served by RHTC Waghodia.

Despite this we found that proper training can definitely makes improvement in irrationally prescribing the antibiotics. By integrating these practices into training, we aim to sustain and build upon the improvements seen in prescription quality, ultimately enhancing patient care and safety.

There are some limitations. Intern batch changed every month so prescription audited for the baseline data and the data after the training status were not of the same subjects as well as audit conducted quarterly so three different batches of interns changed over this time.

CONCLUSION

To ensure consistent enhancement in prescription practices, it is crucial to continue training exercises over an extended period, reinforcing gains and allowing for continuous refinement of skills. Proactive steps to address individual and systemic factors contributing to prescription errors can significantly enhance patient safety and optimize care quality. By focusing on training and regular audits, we can systematically address deficiencies and try to do continuous improvement, ultimately contributing to higher standards of patient care and safety within our healthcare facility.

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