Original Article

Lack of Essential Competencies in Prescribing among the Health Care Providers due to Absence of Proper Integration during Undergraduate Medical School Training

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Article Info

Article history:
Received 16 Aug 2021
Accepted 25 Dec 2021
Published 14 Feb 2022
Keywords:
Prescription errors
WHO core drug indicators
NCC MERP
Health care
irrational drug use
medical education
clinical pharmacology and therapeutics

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Abstract

Background & Objective: The objective of the study to assess the incidence of the prescription errors done by the medical practitioners and to grade its severity as per NCC MERP criteria and their compliance with the WHO core drug prescribing guidelines. The study focuses on the feedback by the doctors related to the prescription errors and the reasons for the same.

Materials & Methods: A multicenter, cross-sectional study was conducted in Out-patient departments of several hospitals in Hyderabad wherein 360 prescriptions were randomly selected and assessed for prescription errors. A self assessment form for the overall prescription skills was given to the medical practitioners along with the feedback from for improvement of the same.

Results: Evaluation of the prescriptions had shown that almost all the prescriptions did not comply with the set WHO core drug indicators and majority of the prescriptions landed under the category of clinically insignificant errors of the NCC MERP criteria. The feedback from the doctors laid emphasis on the integration of the pharmacology with the clinical medicine during the internship.

Conclusion: The study focuses the significant lack in the prescribing competencies amongst the medical practitioners and noncompliance with the WHO Set guidelines for core drug prescribing. The study emphasizes on the need of the medical education department to focus on the same for the prevention of the significant errors and help in reducing the disease burden on the society.

Introduction

A Prescription has been defined as an instruction written by a medical professional during patient management which allows a patient to be issued with a medicine and/or treatment and reflects the quality of health service being provided to the patient. [1] It has a medico legal significance and a medical practitioner has to follow a set of guidelines issued by the WHO in writing the prescriptions. Any negligence during prescription writing process that leads to incorrect guidance about one or more of the essential features of a prescription can be referred to as a 'Prescription error'. [2].Prescribing errors inevitably lead to irrational use of drugs which can not only elevate the cost of treatment and elongate the duration of therapy but also could lead to emergence of drug interactions, resistance and incidences of adverse drug reactions. [3] As a consequence, mortality, morbidity and the financial burden on patients increase.

According to the World Health Organization, Rational use of medicines necessitates that patients obtain medications appropriate to their clinical requirements, in doses that meet their individual needs, for optimum duration of time and frequency as well as at the lowest possible cost to them and their communities. Irrational use of drugs has become a cause of serious concern worldwide. Use of multiple medications per

patient, called "poly-pharmacy"; employing antimicrobial agents for non-bacterial conditions; over-use of injections even when oral formulations would be more appropriate; deviations from the clinical guidelines while prescribing; inappropriate self-medication of prescription-only medicines; non-compliance to dosing regimens are all excellent examples of irrational use of drugs. The reasons for non-compliance with the set guidelines may be lack of essential knowledge, increased work load, poor working environment and/or lack of understanding the importance of the guidelines.

An important aspect which is to be focused is that pharmacology is being taught to the medical students during the second year of their medical school whereas clinical exposure starts during the final year and internship. By this time, the basic concept of pharmacology, mechanism of action of various drugs, their actions, pharmacodynamics and pharmacokinetic interactions, their adverse effects and how to identify and manage those adverse effects would have been faded.. So there is a need to assess the degree of the prescription errors done by the medical practitioners and to grade its severity using the WHO set criteria. Also there should be workshops or CME's to freshen up the knowledge in this field, which is an essential component of good clinical practice.

Materials and Methods

A multicenter, Out-patient based, cross-sectional research was conducted in various hospitals in Hyderabad, India ensuing the attainment of clearance from the Institutional ethics committee. Confidentiality of all the subjects was maintained thoroughly during the entire course of study after receiving a signed written informed consent. The current study was conducted for the duration of 3 months from May 2020 to June 2020. A total of 360 outpatient prescriptions were randomly selected regardless of patient demographics, medical diagnosis and department.

All of the 360 prescriptions were then analyzed for the following characteristics:

According to the WHO guidelines:

- Completeness of the prescription with respect to:
- General information: Name, age, sex, Opd number, consultation date, legible handwriting.
- Medical parameters: Diagnosis, history, vitals, examinations, dose, duration of therapy, route of administration, frequency of dosing, follow-up advice, referral details, do's and don'ts, signature and MCI registration number.
- The core drug use indicators framed by the World Health Organization [4] as detailed in Table 1.

The patient care indicators comprise average consultation and dispensing time while excluding the time spent waiting. Presence of a copy of EDL in all study OPDs and in-stock availability of every key drug specified by each hospital authority was inspected for health facility indicator.

According to the NCC MERP: [5]

Category A: Circumstances or events that have the capacity to cause errors.

Category B: An error occurred but the error did not reach the patient.

Category C: An error occurred that reached the patient but did not cause harm

Category D: An error occurred that reached the patient and required monitoring to confirm that it resulted in no harm to the patient and/or required intervention to preclude harm

Category E: An error occurred that may have contributed to or resulted in temporary harm to the patient and required intervention.

Category F: An error occurred that may have contributed to or resulted in temporary harm to the patient and required initial or prolonged hospitalization.

Category G: An error occurred that may have contributed to or resulted in permanent patient harm.

Category H: An error occurred that required intervention necessary to sustain life.
Category I: An error occurred that may have contributed to or resulted in patient's death.
Category A leads to 'No error', while category B, C, and D leads to 'Error, no harm'. 'Error with harm' is produced by errors that fall into the Categories E,,G and/or H and fatality occurs if any prescription error happens to fall in the category I.

A feedback forms assessing the self-prescribing competencies and the reason for the lack of same was given to the medical practitioners along with their ideas for improvement was collected. The data obtained were summarized and expressed as descriptive statistics using Microsoft Excel sheets. The data was analyzed using SPSS (version 16) and then presented in the form of table and bar chart.

Table 1: The World Health Organization Core Drug Use Indicators

Core Drug use Indicators	Frequency/ percentage
Prescribing Indicators:	
Average number of drugs per encounter	4.24±2.32
Percentage of drugs prescribed by Generic name	5.23%
Percentage of samples with an antimicrobial prescribed	84.6%
Percentage of injections per prescription	28.6%
Percentage of medicines prescribed from the EDL of hospital	96.5%
Patient care Indicators:	
Average consultation time	4.35 min
Average dispensing time	1.8 min
Percentage of drugs actually dispensed	95.4%
Percentage of drugs adequately labeled	72.5%
Patients knowledge of correct dosage	96.5%
Health facility indicators	
Availability of a copy of EDL in all OPDs	26.5%
Availability of key drugs	98.2%

Result

Out of the 360 prescriptions examined, almost all of them (98.7%) were found to have the general information mentioned including name, age, gender as well as the Out-patient department (OPD) Registration number. Date of consultation was entered in 70% of the prescriptions and slightly more than half of them i.e., 52.5% were found to have been written in a clear and cogent handwriting. Coming to the medical components, only 5.3 percent of the prescriptions mentioned the diagnosis. Pertinent history, vitals, examinations performed was expressed in 26.2 %, 88.9% and 18.2% of the prescriptions respectively. Significant medication information i.e., dose, dosage, route of administration and frequency of dosing were indicated in 82.7%, 92.5%, 46.3% and 98.2% of the prescriptions respectively. Follow-up advice was mentioned in 34.7% of the samples, but out of 250 samples that required referral, only 46.6% had the reason for referral mentioned. Very few samples (15.8%) were equipped with the dos and dont's. Nearly all of the samples had the medical professional's signature; however, the number of samples with MCI registration number was negligible. [Figure 1].

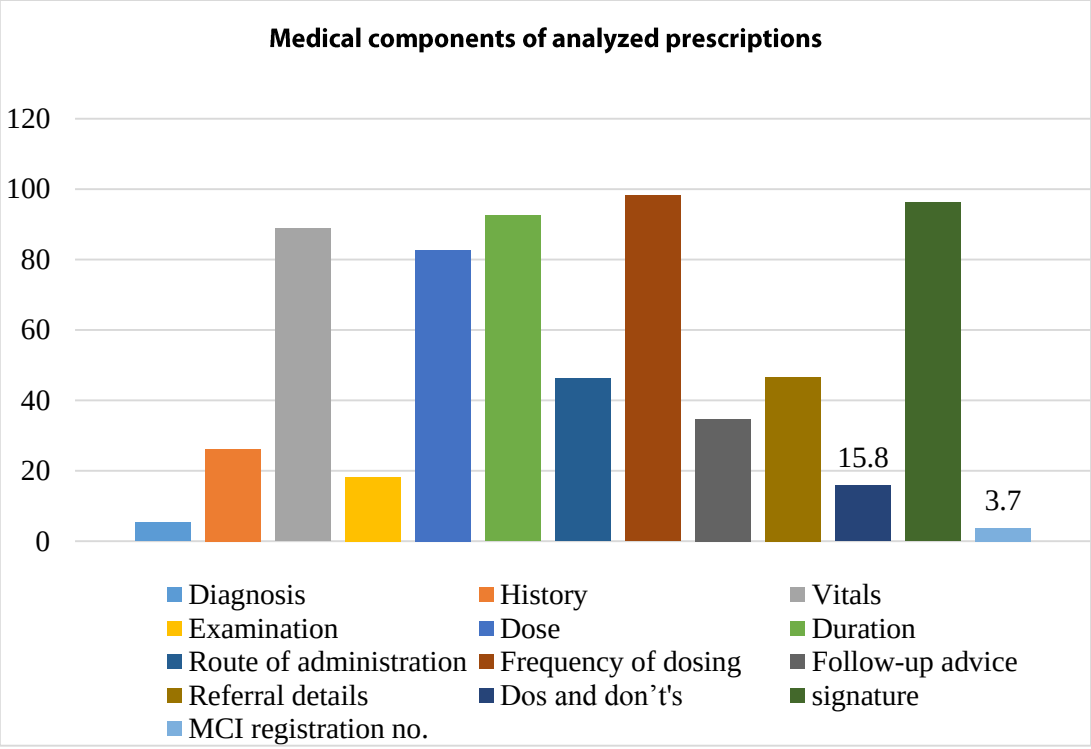

Figure 1: Medical components of the analyzed prescriptions

On the other hand, an average of 4.24 medicines was prescribed to each patient. 5.23% of drugs were prescribed using generic names. The number of prescriptions with the antimicrobial agents were 84.6%and the percentage of injections per prescription was found to be 28.6. A whopping 96.5% of the medicines prescribed were from the respective EDLs. The average consultation time was found to be 4.35 minutes whereas the average dispensing time was found to be 1.8 minutes. Out of all the drugs prescribed, 95.4 percent were actually dispensed and among them, 72.5% were adequately labeled. 96.5% of the patients were found to have sufficient understanding of their dosage.

Among the 15 OPDs evaluated, 26.5 % had a copy of EDL available with them and 98.2% of the key drugs were found to be available.

When the 360 cases were analyzed against the categories published by the NCC MERP, it was found that majority of the errors (86.4%) were insignificant clinically. 11.4% of the prescriptions led to clinically significant errors with 0 fatalities. [Table 2]

Table 2: Scoring of Prescription errors based on NCC MERP

Scoring of Prescription errors			
Significance of Error	Type	Error Score	Percentage
	No Error	0	2.2
Clinically Insignificant	Error, But no Harm	1	86.4
Clinically Significant	Error, Harm	2	11.4
Fatal	Error, Death	3	0

When analyzed for the self-perceived prescription skills by the medical practitioners, they scored around 7.2 ± 1.2. (table 3)76.6% of the medical practitioners had no knowledge of the WHO Core drug prescribing indicators and 82.9% of the doctors does not have knowledge regarding NCC MERP.[5] The reason for the lack of prescribing competencies is outlined in table 4. Many doctors reasoned out the poor work environment and high patient flow is responsible for the lack of completeness of the prescriptions.

Table 3: Self Perceived prescribing skills of the medical practitioners

Self Perceived Prescription Skills	7.2 ± 1.2
1. Correct Diagnosis	8.1 ± 0.9
2. Appropriate Drug Selection	6.7 ± 1.0
3. Prescribing dosage	6.9 ± 1.1
4. Route of administration	7.9 ± 0.8
5. Clear Instructions and Warnings of treatment	6.4 ± 0.72
6. Polypharmacy	7.6 ± 1.3
7. Analysing the correct duration of treatment	8.7 ± 0.88

Table 4: Reasons for lack of prescribing competencies among the medical practitioners

Lack of Knowledge of WHO core drug criteria	76.6%
Lack of Knowledge of NCC MERP	82.9%
Lack of Integration of Clinical Pharmacology and Clinical Cases during Internship.	96.5%
Lack of Proper training During Undergraduate Study Period	92.4%
Poor Work Environment	45.3%
High burden of patients	376%
No recent CME's conducted on Clinical Pharmacology and Recent Advances	78.1%
No proper Follow up by the concerned authorities	24%

Discussion

Prescription is the one of the most significant interventions by the doctor and hence, it is the moral and legitimate obligation of the medical professional to compose complete and cogent prescriptions. In the present study, the date of prescription and other patient information like the name, age, and sex were found to be present in nearly all of the prescriptions studied. The incompleteness of patient demographic details has become uncommon owing to the widespread use of computers in hospitals enabling the entry, storage and printing of the patient specific details during the registration. Conversely, there have been researches where prescriptions written by hand were audited and the patient information was found to be incomplete in majority of the samples studied. [6]. In order to ensure that the patient receives right treatment for the right diagnosis, mentioning correct patient specifics are of significant value.

Upon examining the prescriptions, a significant number of them were found to be lacking in terms of history, diagnosis and examination while the vitals were mentioned in most of them. This can be attributed to a number

of factors including busy OPDs leading to insufficient time for the physicians to enter these details, non-specific complaints by patients and oral communication between the patient and the doctor instead of writing it down.

The dose and the duration of frequency of the drugs were stated in most of the prescriptions, however not all. About 17.3% omitted the dose of the drug, 7.5% lacked dosage information, 53.7% lacked route of administration and 1.8% lacked the frequency of the treatment.[Table 1]Since most medicines are available in a variety of doses, dosage forms, lack of precise instructions have the potential to engender mistakes while dispensing. This could lead to under-dosing, overdosing or wrong-dosing, all of which could cause failure of therapy, elevate antimicrobial resistance, as well as adverse drug reactions. Furthermore, follow-up advice, reasons behind the referral and do's and dont's during the therapy were found absent in more than half of the samples which further exacerbates the above mentioned problems. In fact, a number of studies around the world have found the entry of wrong dose, omission of dose and incorrect duration to be the most frequently encountered prescription errors. [7, 8, 9].

Doctors have been criticized by the public since always for their illegible handwriting, which can give rise to medication errors, dispensing of incorrect drug, and potential ADRs. We found that nearly half the samples i.e., 47.5% of the prescribing practitioners had incomprehensible handwriting. Although close to 100 percent of the samples contained the signature of the prescribing professional, only about 3.7% of them included the Medical Council of India (MCI) registration number. Theseelements are extremely essential in order to identify the prescribing personnel and for the validation of the authenticity of the prescriptions. The use of capital letters while prescribing drugs along with the introduction of a prescription chart with all the necessary details printed can eradicate these errors. Incorporation of computerized prescriptions wherever possible would be another helpful step.

The WHO has developed certain indicators to measure the performance of health-care providers in various essential areas pertaining to rational use of drugs including the prescribing indicators, patient-care indicators and health-facility indicators. [4]. Our study showed that on an average, 4.32 drugs were prescribed per encounter which is higher when compared to the drug use patterns in many other studies. [10, 11]. This indicator determines the polypharmacy. While the WHO recommends 2 drugs per encounter, our results are more than double of the recommended value. Polypharmacy not only increases the health-care cost for patients and the governments but also cause adverse drug reactions arising from drug-drug interactions. Most of the drugs were prescribed from the EDL of the respective hospitals but only around 5% of them were prescribed by generic names. This is in contrast to the study conducted by Singh et al. [11], where majority of the drugs were prescribed using generic names. One of the most important reason for prescribing the drugs by the brand names might be due to extensive marketing by the pharmaceutical agencies. Doctors may prescribe a drug that is marketed by a pharmaceutical company due to the gifts offered by the company rather than based on the true potency of the drug. This might lead to lower potency drug being given to the patient for the personal benefit of the doctor. Although this fact is proved, it might be the case especially in private clinics and personal practices. A whopping 84.6% of the samples contained an antibiotic which is far beyond the WHO recommendations (20-25%). This extremely high incidence of antibiotic prescription highlights the irrational use of antibiotics in the present research setting. Doctor's over-prescription of antibiotics and overconsumption by public are the major causes behind the dangerous rise in antibiotic resistance;

thereby, threatening our ability to treat common infections. Therefore, stringent rules and regulation should be in place to preclude such unfavorable situations. To elevate consciousness among the medical practitioners with regards to antibiotic prescription, they should be educated regarding antimicrobial resistance through regular training and certification programs. Awareness among the general population to consume antibiotics only when suggested by a certified medical professional, to avoid over-the-counter medicines and use of left-over medications is equally crucial.

The average consultation time, meaning the time when the patient enters the doctor's room to the time he leaves the doctor's room, was found to be 4.35 minutes in our study. This is quiet insufficient given the fact that the physician is required to conduct a thorough examination of the patient, prescribe the most appropriate therapy and have interaction. [4]. The consultation time was determined by asking each patient about the time spent in the consultation room and hence, can be subject of bias since patients might recollect incorrectly or because they have a general perception that doctors do not provide with enough of their time. The reason for lesser consultation time might be because of heavy patient burden that might be one of the leading reasons for most of the errors committed during the prescription writing.

The dispensing time, on the other hand, meaning the average time the person dispensing pharmaceutical products at the pharmacy spends with the patient, was found to be 1.8 minutes, which happens to be too little considering the fact that pharmacists are obliged to explain the dosages, frequency, necessary precautions and the possible adverse effects as well as instructions regarding storing and discarding the products safely. When enquired by the patients, maximum patients informed that they were not given proper instructions regarding the drug, its dosage and route of administration. Even the side effects and interactions with food were also not informed.

Among all the OPDs included in the study, it was discouraging to observe that only a quarter of them had a copy of EDL readily available for reference. This is essential to enhance the rational drug use and to improve the quality of care provided. However, 98.2% of the key drugs mentioned in the EDL of the hospitals were found to be available for access.

As per our study, Even though the incidence of prescription errors were quite high but it can be seen that most of the errors fell into the category of being clinically insignificant meaning they belong to the categories B,C or D according to the NCC MERP. Though there were 0 fatal errors found, about 11.4% prescriptions belonged to the either E, F,G or H which are all clinically significant causing loss to the patient and also, increasing the cost of treatment. Most of the errors that were clinically significant were either because of lack of knowledge of the prescribing drug, its mechanism of action, adverse reactions and possible drug interactions.

The most common reason for the same was given as the lack of knowledge of the set guidelines by the WHO for the core drug prescribing indicators. The other reasons stated were that the mechanism of action and adverse drug reactions were learned mostly during the second year of the medical undergraduate period, much before they learned the clinical cases and diagnosis. There was no official training or revision in the field of pharmacology during or after internship. Most of the doctors felt that pharmacological training should have been incorporated along with medicine during the final year as it is the most important part of treatment after diagnosis. A development of the module that focuses on the clinical pharmacology and therapeutics during internship might help in preventing prescription errors.

The objective of rationalizing prescriptions and continuous enhancement of health care delivered by hospitals in India can be achieved through regular prescriptions audits performed by eligible personnel.

In addition, arrangement of workshops for the practicing physicians as well as the medical interns during which adequate training is provided for the following essential wisdom could be efficacious. The workshops should focus on the knowledge of Mechanism of Action of commonly used drugs to extrapolate the likely effects of drugs and its combinations, Practical knowledge of pharmacological principles to use Appropriate Dosing regimen to optimize drug effects, Rational prescribing of the medicines by choosing the correct indicated drug and its route of administration, Understanding of Pharmaco-epidemiological factors affecting the drug utilization, Knowledge of Common and severe Adverse Drug Reactions, their identification and management, Training on Drug Errors, their identification and correction and the knowledge of Drug Overdose of the commonly used medicines.

Medical Education Units of the medical schools should focus on development of a clinical pharmacological and therapeutics module that focus on the above mentioned points and try to incorporate it in the form of workshop or CME's during the final year or during the internship so that the burden on the healthcare system due to lack of essential competencies in the prescription writing can be lessened.

Conclusion

The present study focuses on the incidence of the different types of prescription errors done by the medical practitioners during their clinical practice that can lead to a burden on the health care system. The reason for this lack of prescribing competency is the lack of adequate training during the undergraduate period in medical school. Our study emphasizes the need of development of a module that focuses on clinical pharmacology and therapeutics and its incorporation during the internship so that medicine and pharmacology can be learnt simultaneously.

Conflicts of interest

The authors have no conflicts of interest associated with the material presented in this paper.

ACKNOWLEDGEMENT: We acknowledge Dr Fouzia Nausheen, HOD Pharmacology and Dr Mohammed Samiullah Khan for their continuous support during the study.

FINANCIAL SUPPORT AND SPONSORSHIP: None

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