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RESEARCH ARTICLE

PRESCRIPTION ERROR ANALYSIS IN A TERTIARY HEALTH CARE CENTRE, IN RURAL KARNATAKA, INDIA

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Abstract

Background: The focus of healthcare technology now, is to improve the quality of care and safety to the patients, a key component of which is medication-related errors. Medication errors result in an increase in the rate of hospital admissions and expenditure for the patient. Thus, it is important to identify the cause of these errors and develop a solution to curb their occurrence.

Materials &Methods:A prospective, cross-sectional study was conducted on 300 randomly collected prescriptions, in a tertiary care hospital, Kolar, for a period of 2months, after obtaining the Institutional Ethical Clearance. The prescription writing errors such as errors of Omission and Commission were documented.

Results: The data were analysed by using descriptive and inferential statistic.There were 93.7% omission errors (281 prescriptions), 66.3% of commission errors (199), and a total of 97.63% (292) of errors.

Conclusion: The prescribers and dispensers play an important role in prescription errors and early detection and timely intervention of these errors can increase the quality of care to the patients. The findings of this study can serve as a baseline for policymakers for monitoring drug therapy and improving the process. It also draws attention to prescribing practices from across the country and among other countries, all over the world.

Introduction:-

The importance of the pharmaceutical industry has risen over the past few decades. From just preparing and formulating the drugs, they have acquired an important position in the healthcare industry.

The focus of the healthcare technology now is to improve the quality of care and safety of the patients, a key component of which is medication-related errors.[1]

The result of medication errors can vary from being harmless to life-threatening. This leads to an increase in the rate of hospital admissions and expenditure on the patient[2]. Hence it is important to identify the cause of these errors and develop a solution to decrease their incidence[2].

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A prescription is an order which is given by the doctor to the pharmacy to dispense the drugs, and it should contain the details of the patients, drug details like the name, dose, route of administration, strength of the drug, duration of treatment, and finally, the details of the doctor [3]. It is a document that serves three purposes- a clinical document, legally binding, and acts as an invoice. Some data on it are for legal information whereas the others might serve purely as instructions to the patient [4].

A study conducted in a teaching hospital concluded that about 4 in 1000 prescriptions have errors that could result in adverse effects. Prescription errors constitute 70% of those medication errors that are responsible for adverse effects [5].A meta-analysis report showed that prescription errors made by junior doctors vary from 2-514 per 1000 prescriptions [6].

There are two types of prescription errors, commission, and omission. Commission errors are due to incorrect drug information, like incorrect dosage, strength, route of administration, illegible writing, duration of administration, wrong drug name, drug-drug interactions, etc. [3,7] Whereas omission errors include those with incomplete information on the prescription, like, the name of the patient, age, hospital details, doctor's name, and signature, diagnosis and illegible prescription [5].

(Neville et. Al., 1989) classified prescription errors based on the inconvenience they cause to the drug dispensing as follows:[8]

Type A - potentially serious to the patient. Type B- errors that make the pharmacist contact the prescriber, to clarify and dispense the medicine. Type C- minor inconvenience which requires the prescriber to take a professional decision before dispensing the drug. Type D - trivial errors like the omission of the date, age, gender, etc., of the patient [8].

Studies have shown that not many doctors adhere to the prescribed guidelines for drug prescriptions, which might have an impact on a patient's health [9,10]. WHO has prescribed a few indicators which are important to promote rational drug use in countries. They indicate the level of polypharmacy, percentage of generic drugs prescribed, degree of antibiotic and injectables used, and the percentage of drugs prescribed from the essential list [11].

The studies of prescription errors have not been done in a tertiary hospital in rural Karnataka, therefore this study will help us understand the prescribing errors, and will provide precise information to this particular setting which will result in the development of healthcare policies, educate the prescribers, which will result in a decrease in the prescription errors and thereby improving the quality of care for patients and healthcare facilities.

Methodology: -

A prospective, cross-sectional study was conducted in a tertiary care hospital, Kolar, for a period of two months, after obtaining the Institutional Ethical Clearance. A total of 300 prescriptions were randomly collected through the pharmacy, from the outpatients visiting the hospital. The prescription writing errors such as errors of Omission related to the prescriber (patients name, age, hospital number, date, prescribers name, prescribers' signature, clinic/department, diagnosis, and illegible prescriptions); errors of Commission related to drugs (route of administration, dose, frequency, strength, dosage form, duration/number of doses, quantity to supply, drug-drug interactions, wrong drug name) were documented in a suitably designed documentation form that is enclosed below.

Results:-

Study design:
A cross-sectional study

Statistical Methods:
Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%).

Statistical software:
The Statistical software namely SPSS 22.0, and R environment ver.3.2.2 were used for the analysis of the data, and Microsoft Wordand Excel have been used to generate graphs, tables, etc**.**

	No. of subjects(n=300)	**%**
UHID		
• No	18	6.0
• Yes	282	94.0
Gender		
• No	40	13.3
• Yes	260	86.7
Age		
• No	57	19.0
• Yes	243	81.0
Diagnosis		
• No	97	32.3
• Yes	203	67.7
Department		
• No	61	20.3
• Yes	239	79.7
UNIT		
• No	83	27.7
• Yes	217	72.3

Table 1:- Baseline Information.

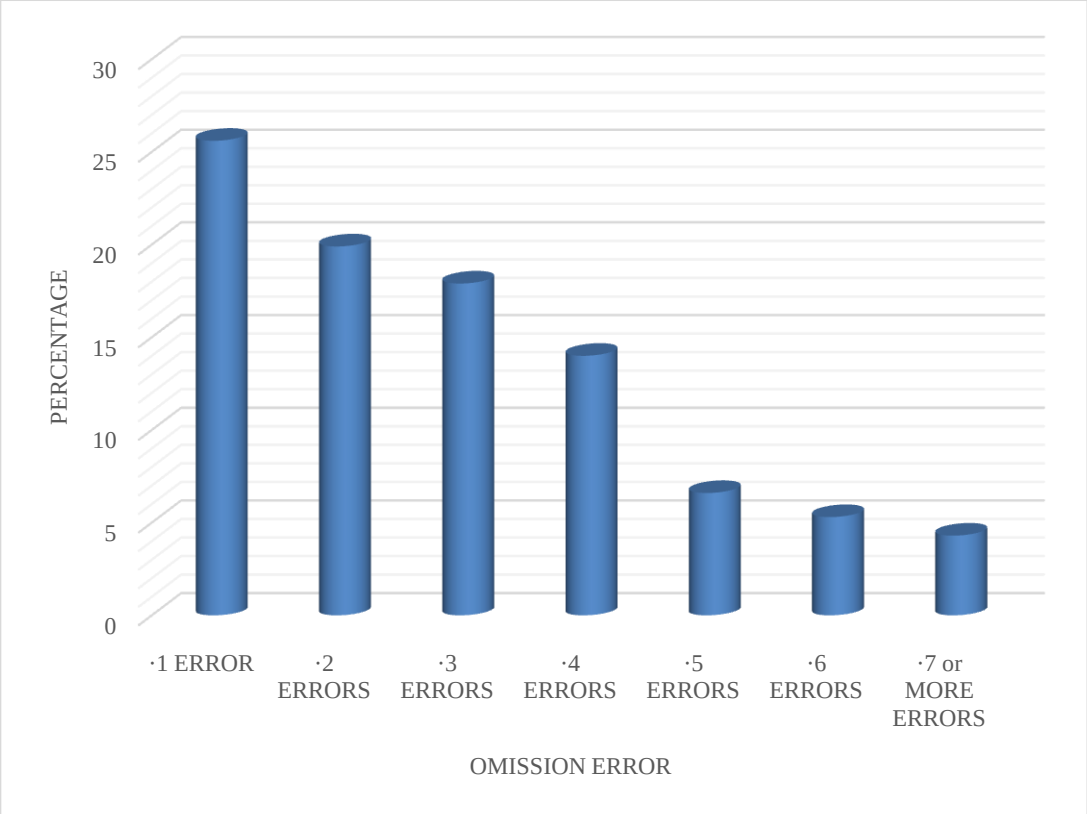
	No. of subjects(n=300)	**%**
Legibility of the drugs		
• No	39	13.0
• Yes	261	87.0
Overwriting/ scratching		
• No	150	50.0
• Yes	150	50.0
Generic name of the drug		
• No	118	39.3
• Yes	182	60.7
Dosage		
• No	69	23.0
• Yes	231	77.0
Route of administration		
• No	114	38.0
• Yes	186	62.0
Signature of the prescriber		
• No	40	13.3
• Yes	260	86.7
Quantity of the drugs		
• No	21	7.0
• Yes	279	93.0
Duration /frequency of treatment		
• No	62	20.7
• Yes	238	79.3
Seal of the prescriber		
• No	172	57.3

• Yes	128	42.7
Date & Time		
• No	95	31.7
• Yes	205	68.3

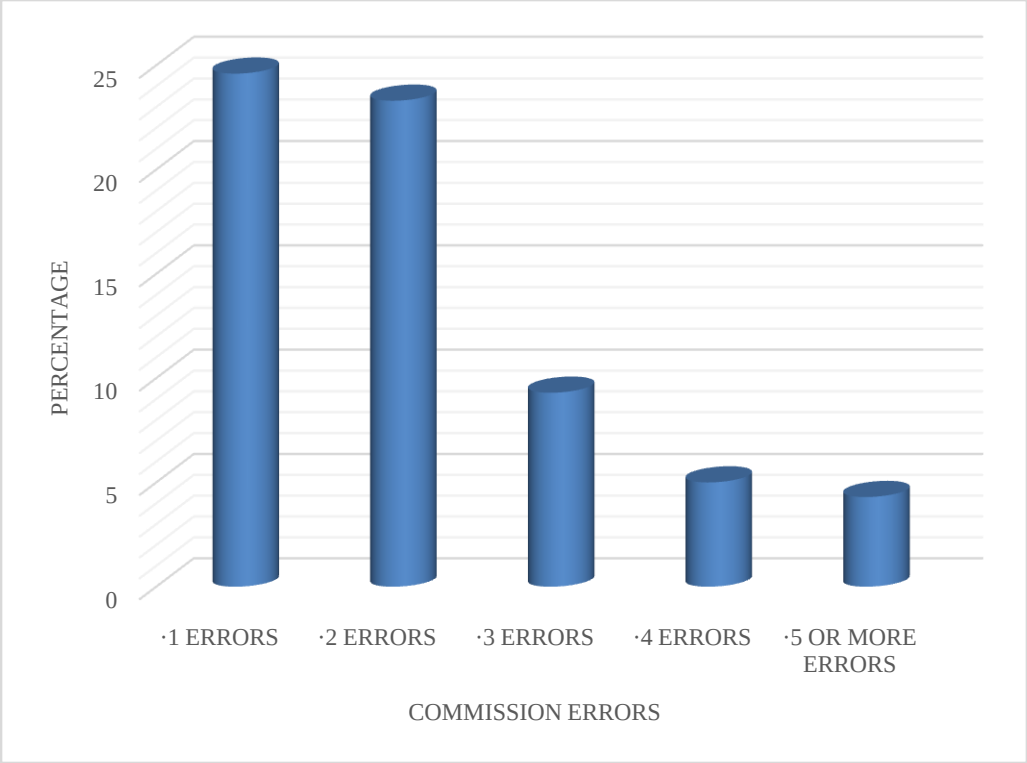
Table 2:- Prescription error analysis in a Tertiary Health Care Centre.

	No. of subjects (n=300)	**%**
OMISSION ERROR		
NO	19	6.3
YES	281	93.7
COMMISSION ERROR		
NO	101	33.6
YES	199	66.3
TOTAL ERROR		
NO	8	2.7
YES	292	97.3

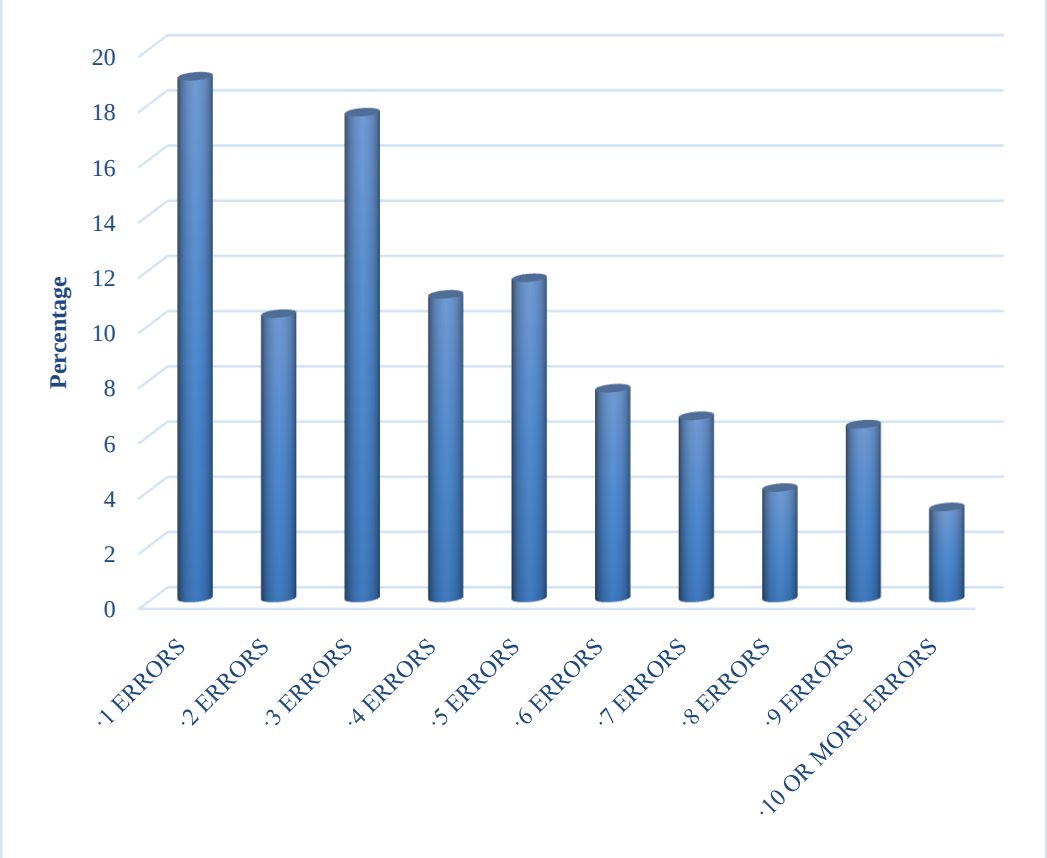
Table 3:- Omission/CommissionErrors.



Graph 1:- The number of Omission Errors.



Graph 2:- Commission Errors.



Graph 3:- Total Number of Errors.

Graph 4:- Mean Omission and Commission Error.

The study was conducted by randomly analyzing 300 prescriptions in R.L.Jalappa Hospital, Tamaka,Kolar. It was a prospective study and the omission & commission errors were calculated as follows:

It was found that the UHID (Unique Hospital Identification) was present in 94%, Gender in 86.7%, Age in 81%, Diagnosis of the disease in 67.7%, Department which is prescribing the drug in 79.7%, Unit in 72.3 % of the prescriptions that were analyzed. These formed the basic details of all the patients in the prescriptions.

Coming to the content of the prescriptions, 60.7% of the drugs were written in their generic name, 77% of them had their dose specified, 62% had mentioned the route of administration of the drug, 93% of them had specified the quantity of the drugs to be dispensed, 79.3% had mentioned the duration which they had to administer the drug.

87% of the prescriptions were legible and 50% of them had scratches or were overwritten.

It was found that 13.3% (40) of the prescriptions did not possess the signature of the prescriber and 57.3% (172) of the forms did not have the seal with their register number.

On the whole, it was found that there were93.7% omission errors (281 prescriptions), 66.3% of commission errors (199), and a total of 97.63% (292) errors.

It was further analyzed that, in omission errors, 25.6% of prescriptions had 1 error, 19.9% had 2, 17.9% had 3, 14% had 4,6.6% had 5, 5.3% had 6 and 4.3% had 7 or more errors per prescription. Similarly, in commission errors, 18.9% of prescriptions had 1 error, 10.3% had 2, 17.6% had 3, 11% had 4,11.6% had 5, 7.6% had 6 and 6.6% had 7, 4% had 8, 6.3% had 9 and 3.3% had 10 or more errors per prescription.

An average of 4.13 errors was found per prescription, with 2.72 omission errors and 1.41 commission errors.

Discussion:-

A prescription serves as an instruction from the prescriber to the dispenser [12].

Out of 300 prescriptions, it was noted that a total of 8 prescriptions (2.7%) were error-free. The average number of errors found in this study was 4.13 per prescription. It constituted 2.72 omission errors and 1.41 commission errors per prescription. This value seemed to be higher than the standard acceptable range of 1.6 – 1.8 errors per prescription. Another study that was conducted in a North Indian teaching hospital, in 2012, showed an average of 5.6 errors per prescription [13].A similar study that was conducted in a Gulbarga teaching hospital showed an average of 3.11errors[7] and in Bangalore showed an average of 2.6 errors per prescription[14].

The reason for a higher number of average errors is mostly due to polypharmacy. The higher number of drugs per prescription might be due to several reasons, of which, unskilled medical professionals, lack of proper prescription guidelines, cuts to the doctors from the pharmacy, and lack of updates in the treatment protocol. Polypharmacy not only increases the number of errors but also decreases the compliance to treatment in terms of the patient, increases the financial stress on them, and also has a higher chance of adverse drug reactions[14].

The WHO recommends that all prescriptions are to be written in a generic format. This is one of the most important safety measures as it provides for easy access to medicines and enhances communication among the healthcare staff, throughout the world [15]. Different drugs are known by different names throughout the world; hence the generic name standardizes the drug name and maintains uniformity of the drug name, ease of understanding and dispensing of drugs, and decrease in the economic burden to patients [14]. In this study, 61% of the drugs were prescribed in their generic name. The optimal value as prescribed by WHO is 100%.

A study conducted in Mandya, Karnataka showed that only 9.7% [12] and in Nagpur showed that 15% [14] of the drugs were prescribed in generic form. Similarly, studies conducted in Pakistan showed 23.3%[15], Andorra 6% [16], Lebanon 2.9% [17].

There are a few basic details that are required to be mentioned in the prescription like name,age, gender, and diagnosis.

The results of this study showed that 99.67%, i.e., 299 out of 300 prescriptions had the patient's name. The details of gender were absent in 13.3% and that of age were absent in 19% of the prescriptions. Similar results were found in a study by Vaishali et al., [18]in Maharashtra, wherein age was missing in 11% and gender in 10% of the prescriptions. Studies conducted in Karnataka by Srinivasa J et al., in Bangalore [19](99%, 87.8%, and 96%)and Nagashree BN [12]et al. in Mandya (100%,52.2%, and 18.5%), showed that name, age and gender were of the respective percentages of the prescriptions analysed.

A study conducted in Bahawalpur, Pakistan [15]showed that more than 65% of the prescriptions did not have the patient's age and gender. 14.5%,10%, and 4.1% of prescriptions in a study from Saudi Arabia [20] were missing the details of patients' name, age and gender, respectively.

In this study, it was found that 32.3% of the prescriptions did not have the diagnosis written in them. Similar studies conducted by Ather et al., (9.31%)[7], Atif et al., (37.3%)[15], Irshaid et. al.,(6.8%) [20], and Srinivasa J et al., (10.3%) [19]had the respective deficiencies in writing the diagnosis in the prescriptions.

One of the most important piece of information that is required in any prescription is that of the prescriber. Their name, qualification, registration number, signature, and seal are of utmost importance [19]. However, this study reveals that the prescriptions were lacking in one or more of them and were thus incomplete.

The information of the prescriber is an integral part of a prescription as it aids the pharmacist in contacting the prescriber for clarification or discussion of the prescribed medicines.

This study showed that the seal of the prescriber containing the registration number was absent in about 57.3% of the prescriptions, which was alarming. A similar study in Pakistan [15] revealed that 95 % of the prescriptions did not possess the registration number. Vaishali et al.[18], reported the absence of registration numbers in 73.9% of the prescriptions. A Malaysian study showed that the registration number was lacking in 0.5% of the prescriptions [21]. However, a study in Mandya[12]showed that it was absent in all the 113 prescriptions that were analysed. The registration number is essential as it is a mandatory requirement to prescribe drugs.

The signature of the prescriber validates the prescription and its absence should alert the pharmacist before dispensing the drug, especially if it is not an over-the-counter dispensed drug [21].This study showed that the prescriber's signature was absent in about 13.3% and date in 31.7%. A study conducted in Saudi Arabia showed the absence of prescribers'nameswas in 7% [11] and the date was absent in 64.3% [20].The absence of signature was present in 33.3% (Laura et al.) [5], 0.3% (Kuan Mun Ni et al.) [21], 1.9% (Srinivasa J et al.)[19], 9.31% (Ather et al.) [7]and 12 % (Vaishali et al.) [18] of the prescriptions respectively. However, 100% of the prescriptions had signatures in a study conducted by Nagashree BN in Karnataka [12].

The medication details in prescriptions have to be complete to avoid irrational prescription use and to decrease prescription errors. Deficient prescriptions can lead to overdosing or underdosing of medicines and thereby increase in morbidity or rarely mortality to the patients and unwanted expenditure and financial burden on the patients and their family[15].

In this study, it was found that the duration of treatment was absent in 20.7% of the prescriptions, the quantity was not specified in about 7% of them, the route of administration was not mentioned in 38% and the dosage of the drugs and duration of treatment was not mentioned in 23% and 20.7% of the analysed prescriptions respectively.

The study conducted in Pakistan [15] showed that nearly 50% of the prescriptions did not mention the duration of treatment. A study from Bahrain [22] reported that duration was not mentioned in 18.5% and frequency of administration was missing in about 3.7% of the analysed forms.A study conducted in Saudi concluded that 6.9% and 7.5% of the prescriptions did not mention the frequency and number of doses respectively [20].A similar study in Maharashtra, India reported that the strength of the drugs, dosage and duration of treatment was absent in 26.8%, 35.1%, and 26.2% respectively [18].A study conducted in rural Karnataka showed that there was a lack of mention

of drug duration (30.68%), strength (14.13%), dosage (7.93%), quantity (6.20%), and frequency of administration (4.4%) [7].

Illegible handwriting can lead to misinterpretation of drugs and wrong dispensing that can be potentially fatal to the patients [12]. 87% of the prescriptions were legible and 50% had been overwritten. In a study in South India [12], it was found that 96.4% of the prescriptions were legible whereas 86.8% of prescriptions were legible from a study in Haryana [23].A survey among doctors showed that poor handwriting is mainly due to heavy workload in them and educational interventions usually prove to be effective [24]. Kuan Mun Li et al [21]., reported 7.1% of prescriptions had illegible writing, and Ather et al., [7].reported that 10.34% of their prescriptions were found with illegible writing. Sinha et al. [25]reported that 25% of their errors were due to prescription errors.

In this study, the omission errors were about 93.7% of the total prescriptions and commission errors formed 66.3% of the prescriptions.

A study conducted in Gulbarga, Karnataka showed that out of 290 prescriptions analysed, there were 635 omission errors and 184 commission errors with 2.18 and 0.63 errors per prescription respectively7. Al Khaja KA et al.,[22] in Bahrain, estimated that 54.1% of the prescriptions had omission errors and 43.5 %had commission errors. A study conducted in Tanzania showed about 100% omission errors and 3.1% of commission errors [26],whereas, a study conducted in Kuala Lumpur showed an average of 96.7% of Omission Errors and 8.4% of commission errors [21].

These errors are preventable by various corrective measures like one-to-one education, prescription auditing, and feedback. These methods have proven to improve prescribing practices [27].Other methods that might help in decreasing errors, especially among the junior faculty include group discussions, interventional strategies, detailing, and support tools. Tools like Objective structured clinical examination (OSCE) can be used to train the students and improve their awareness of medication errors[19].

Prescription writing has now been computerized in most places. Although its widespread incorporation can be expensive, its benefits will outweigh the risks and prove to be economically useful in largescale, in the long run. The advantages of computerized systems are that it eliminates all the human errors in prescription writing, which form the majority like illegible handwriting, wrong dose, and drug interactions can be minimized. These prescriptions can also be integrated into the medical records of the patients and can thus be accessed by any doctor at any point in time [12]. The newer advances in the e-prescription have integrated the prescription system into the drug database which will recheck the information that is entered and will check if it is appropriate for the patient in terms of his age, other medicines that he is on, his medical condition, weight, gender, etc. and will also indicate the warnings and side effects of the drugs if any. This however should not be used as a substitution for individual patient care and should not reduce the time spent talking or evaluating the patient.

The reduction in the number of prescription-related errors can result in saving time, health, and money for the patient.

Conclusion:-

Prescription errors occur all over the world and they may lead to deleterious effects in patients. Both the prescribers and dispensers play an important role in this and early detection and timely intervention of these errors can increase the quality of care to the patients. In this study, the prescription errors in a tertiary health care hospital in Rural Karnataka were analysed using the established norms as standard. Limited information is available from this region; hence our findings can serve as a baseline for policymakers for monitoring drug therapy and improving the process. Our study also draws attention to prescribing practices from across the country and among other countries all over the world.

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