

## An Investigation on the Nature and Extent of Occurrence of Errors of Commission in Hospital Prescriptions

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### Abstract

Correct prescription writing habits could have a great influence on the fate of drug therapy as well as the health of patients. One of the major types of errors in prescriptions is the "errors of commission". In this study attempts were made to examine 519 prescriptions of the internal ward of Ayatollah Taleghani teaching hospital over a period of 3 months in terms of the nature and extent of the errors of commission. In addition these prescriptions were also compared and contrasted with the actual clinical charts of relevant inpatients.

Results showed that the most predominant error of commission is that due to ignoring drug interactions, noted in 18% of all prescriptions examined. The other major errors of commission noted in these prescriptions included mistakes in writing drug names or prescribing the correct dosage form, ignoring drug interactions occurring because of the condition of patients, and ignoring the side effects of drugs following administration. Furthermore, when comparing the clinical chart of inpatients with their prescriptions, discrepancies were noted. Here, the major problem was not mentioning the name of some of the drugs present within the prescription, in patients' clinical chart.

In conclusion, it seems that educational programs are needed to be held for physicians and nursing staff in order to eliminate errors of commission. Careful examination of prescriptions by pharmacists and decisive interventions by them could also be critical in avoiding this type of prescription error.

**Keywords:** Prescription errors; Errors of commission; Drug interactions; Pharmacokinetical drug interactions; Pharmacodynamical drug interactions.

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### Introduction

The so-called "mode of practice act in pharmacy" was approved in the United States of America in 1977 and since then has been approved by all the major governing bodies worldwide. Based on these modes, the practice of pharmacy includes evaluation and analysis of prescription, preparation and dispensing of drugs, labeling, proper storage of drugs and medical supplies, appropriate maintenance of documents, patient counseling, etc. Among these responsibilities, evaluation and analysis of prescriptions is rather critical, and should be taken seriously as one of the major duties of a

pharmacist as a health care provider (1, 2). A pharmacist is in fact the final barrier before drug reaches the patient. Occurrence of various error at this stage could have unwanted and fatal consequences.

Errors in prescription writing in fact include any deviation from proper rules and guidelines of prescription writing. Should these errors occur merely due to forgetting, not considering something important, or eventually omitting certain information from a prescription, it is referred to as the "error of omission". However, occurrence of an error because of improper comprehension, misdiagnosis, or incorrect selection of a drug leads to deviation from the treatment goal and this type of error is therefore called the "error of commission" (3). The latter

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type of error should be promptly detected and corrected, otherwise patients' health could be threatened or at least the proposed treatment program would be put in danger (4).

The most common errors of commission include mistakes in writing drug names, writing the incorrect dosage form, choosing the wrong strength of the drug, mistake in the required number of dosage units, mistake in prescribing similar drugs, and ignoring drug interactions (5, 6).

In a previous study the extent of damage which could have faced patients, should pharmacists did not intervene and correct errors present within the prescriptions, was investigated (7). It was found that in 53% of cases, lack of intervention or not correcting the problem by pharmacists, created no serious risk for patients. However, in the remaining 47% of cases, a great chance of damage to patients' health existed. The most prevalent problem facing patients was the occurrence of unwanted and undesirable side effects or even toxic effects, being the origin of consequent patient visits to physicians or hospitals.

Hence, because of the great importance of "errors of commission" and the need for their prompt detection and correction, in this study attempts were made to evaluate prescriptions of the internal ward of Ayatollah Taleghani teaching hospital in terms of the nature and extent of occurrence of the errors of commission.

### Experimental

This investigation was in the form of a prospective study and was carried out in the internal ward of Ayatollah Taleghani teaching hospital, which is one of the largest and highly recommended medical centers of Shaheed Beheshti Uniservity of Medical Sciences, over a period of 3 months from January until April 2001. For this purpose 519 prescriptions, containing 2663 drug items and ranging from one to twenty drug items in each prescription, were examined in terms of the errors of commission.

Following the observation and close examination of each prescription, clinical charts of the corresponding inpatients were carefully studied, compared and contrasted with the relevant prescriptions available.

Data obtained from this study were then gathered and carefully analyzed.

### Results and Discussion

Errors of commission could occur as a result of numerous factors such as writing drug names incorrectly by the responsible nursing staff because of not knowing the name properly, repeating the same drug in a prescription by once mentioning its generic name and the other time its brand name (not knowing that they are both the same drug), error in writing the correct strength of the drug or even dosage form, writing another drug by mistake and not intentionally, etc. (8). These mistakes could cause serious problems for the ultimate success of treatment or even patients' health. In some other cases these problems could lead to drug overdose, toxicity or even occurrence of fatal drug interactions, especially in the elderly patients (9).

The errors of commission found in the prescriptions evaluated are summarized in Table 1. As can be seen the most prevalent error of commission is that of ignoring drug interactions, which was noted in 18.0% (in 93 prescriptions) of the 519 prescription examined. Table 2 further shows the various types of pharmacodynamical and pharmacokinetical drug interactions noted in the prescriptions examined. Overall, pharmacodynamical drug interactions were noted in 45 prescriptions. This type of error was especially popular with cardiovascular drugs, resulting in drug synergism and severe hypotension. In actual

**Table 1.** Various errors of commission observed in 519 prescriptions examined.

Errors of commission	Number of prescripts	Extention of occurrence (%)
(a) Ignoring drug interactions	93	18.0
• Drug-drug interactions	18	3.5
• Drug interactions occurring as a result of patients' condition	35	6.7
(b) Mistakes in writing drug names	22	4.2
(c) Mistakes in writing the correct dosage form	5	1.0
(d) Mistakes in writing the correct strength of drug	4	0.8
(e) Ignoring the side effects of drugs	4	0.8
(f) Rewriting the same drug in a prescription (both generic and brand names)	3	0.6
(g) Mistakes in the required number of dosage units	0	0.0
(h) Mistakes in prescribing similar drugs		

**Table 2.** The various types of drug interactions observed in 519 prescriptions examined.

Type of drug interaction	Number of prescriptions	Extent of occurrence (%)
(a) Pharmacodynamical interactions		
• Synergistic effect	35	6.7
• Antagonistic effect	2	0.4
• Indirect effect (through changes in the electrolyte balance of body)	8	1.6
(b) Pharmacokinetical interactions		
(I) Interference in absorption		
• Through chemical reactions (chelate or complex formation)	16	3.1
• Through the effect on the rate of gastric emptying	4	0.8
• Through pH change	2	0.4
• Via changes in bacterial flora of intestine	0	0.0
(II) Interference in diffusion		
• Intracellular diffusion		
• Protein binding	0	0.0
	0	0.0
(III) Interference in metabolism		
• Enzymatic inhibition	17	3.3
• Enzymatic induction	9	1.7
(IV) Interference in excretion		
• Change in pH	0	0.0
• Renal excretion	0	0.0

fact in 21 prescription prazosin or clonidine tablets along with one or even two vasodilator and diuretic drugs, as well as ACE inhibitors, calcium channel blockers and cardiac glycosides were prescribed. Since most of these prescriptions are prescribed for elderly patients, occurrence of unwanted and undesirable effects could be easily predicted.

In other prescriptions concurrent administration of benzodiazepines, hypnotic, anxiolytic and antidepressant drugs were noted. This could again lead to a synergistic effect, consequently resulting in intellectual, respiratory and mobility disturbances, as well as drowsiness and dizziness (10, 11).

In addition, in two prescription pharmacodynamical drug interaction of the antagonistic type was noted when ACE inhibitors and ASA tablets were co-administered. This could in turn reduce or even eliminate the hypotensive effect of ACE inhibitors (12).

The final pharmacodynamical drug interaction noted in 8 prescriptions was the indirectly acting ones. In these drug interactions the electrolyte balance of the body is altered. Examples of these interactions include the concurrent administration of digoxin tablet with thiazide or loop diuretics.

Pharmacokinetical drug interactions were noted in 48 prescription forms (Table 2). The most dominant pharmacokinetical drug

interactions were those of enzymatic inhibition (in 17 prescription) and chemical interactions due to chelate and complex formation (in 46 prescription), respectively. The concurrent use of tetracycline capsules and antacid preparations is a good example of chemical interactions, and an example of drug interaction via enzymatic inhibition is that of erythromycin with drugs in which their metabolism takes place through cytochrome P450.

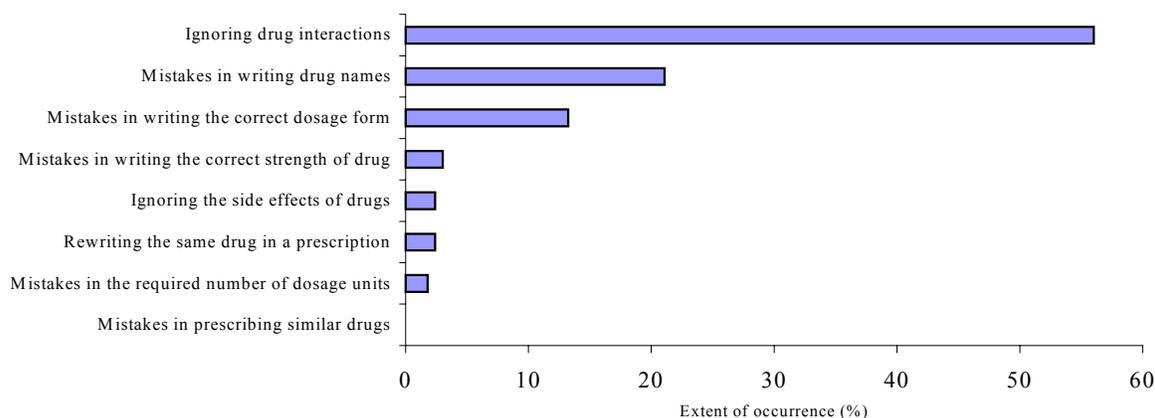
Among the other pharmacokinetical drug interaction were interactions due to enzymatic induction. Concurrent uses of phenytoin with aminophylline, carbamazepine with warfarin, or rifampicin with theophylline are good examples of this type of interaction.

In 4 prescription form the pharmacokinetical drug interaction observed was through the effect on the rate of gastric emptying. In all these prescriptions metoclopramide tablets were used along with diazepam tablets.

The final types of pharmacokinetic drug interactions were those acting via pH changes. This interaction was only noted in 2 prescriptions, both of which contained bisacodyl tablets along with antacids.

Following the error of ignoring drug interactions, mistakes in writing drug names composed (in 35 prescriptions) the second major error of commission (Table 1).

The third major error of commission noted in prescriptions examined were those due to



**Figure 1.** Distribution of various factors resulting in the occurrence of errors of commission (166 cases) in prescription examined.

mistakes in prescribing the correct dosage form (in 22 prescriptions). Unfortunately, in most cases the term “Syr.” (syrup) was used in place of all oral liquid dosage forms (from suspensions to elixirs). This mistake could be due to the lack of awareness of physicians and nursing staff of various pharmaceutical dosage forms.

Among the other important errors of commission observed in 18 prescription forms, was ignoring drug interactions which could occur because of patients’ condition (Table 1). This is most apparent with elderly patients. In these patients administration of drugs causing intellectual and sensory disturbances should be preferably avoided (10). On the other hand inappropriate use of hypnotic, antidepressant and hypotensive drugs, or their use in large doses could result in additional unwanted side effects because of a reduced drug metabolism and renal clearance in these patients.

Mistakes in writing the correct strength of the drug (in 5 prescription), rewriting a drug in the same prescription (in 4 prescription), and ignoring the side effects of drugs following administration (in 4 prescription) were among the other errors of commission observed in the prescriptions examined. Regarding the rewriting of a drug in the same prescription, for example chlorthalidone and its’ brand name, “Librium”, were both written in a prescription. This error is mainly due to insufficient physician or nursing staffs’ knowledge of brand names and hence it is advised to use generic name of drugs in all cases in order to avoid such mistakes. Ignoring the side effects of some drugs such as gentamicin and vancomycin,

which are ototoxic, should also be carefully considered in drug therapy.

Figure 1 summarizes the various factors resulting in the errors of commission within the 519 prescriptions examined. It should be noted that the total number of errors of commission were 166 cases and as mentioned before, ignoring drug interactions represents the greatest error (56.02% of errors).

As part of this study, the clinical charts of inpatients were also compared and contrasted with their prescription forms. The errors of commission observed in the clinical charts of inpatients are summarized in table 3. It is clear that the greatest (in 10% of all prescriptions examined) error noted is due to not mentioning the name of some of the drugs prescribed in the prescription forms, in patients clinical charts. Examples of this error include leaving out drugs such as metoclopramide (oral and parenteral), acetaminophen tablet, and acetaminophen plus codeine tablet. In these cases the nursing staffs have themselves proceeded with writing these drugs in the patients’ prescription forms without the consent of physicians. This error is by no mean acceptable and under no condition should a drug be prescribed without the notification of treating physician. Furthermore,

**Table 3.** Distribution of various factors resulting in the occurrence of errors of commission (166cases) in prescriptions examined.

Mistakes in writing drug names	0
Mistakes in writing the correct dosage form	1.54
Mistakes in choosing the correct route of drug administration	0
Mistakes in the prescribed dose	0
Mistakes in the duration of drug treatment	0
Not mentioning some of the prescribed drugs in patients clinical charts	10

it should be noted that this type of error is also reported as the most common error in a study carried out in the United States of America (13).

Close examination of clinical charts of inpatients also showed that despite the fact that in 35 and 22 prescriptions (Table 1) errors of commission were due to “mistakes in writing drug names” and “mistakes in writing the correct dosage form” respectively, here almost all the drug names and their dosage forms are written correctly. Hence, it seems that during the process of writing prescriptions by the nursing staff, these errors have occurred. Setting up educational classes for nursing staff or better implication of control measures by physicians could help to reduce this type of error.

In conclusion, it should be stated that the presence of errors of commission has also been reported in other investigations (14, 15). Occurrence of this type of error in prescriptions could clearly affect the process of treatment or even cause serious or fatal problems for the health of patient. Hence, the important role of pharmacists in detecting and correcting these problems is quite clear. A pharmacist should examine every single prescription, talk to patients regarding their ailments, and when needed contact the responsible physician.

Proper interventions by pharmacists could be highly valuable in eliminating errors of commission. Furthermore, continued educational programs for physicians and the nursing staff could be used in order to increase their awareness of these problems and can also help to educate them to phase out these errors in practice.

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