Original Article

Medication Errors in Dentistry —
A Cross-Sectional Study

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Abstract

Background: *Prescription errors are quite frequent in routine dental practice but are hardly ever reported. These errors cause significant morbidity, mortality and health care costs to the society.* **Aims & Objectives:** *To analyze current prescription writing practices among dentists and to identify and quantify various types of medication errors in dental prescriptions.* **Materials and Methods:** *A cross-sectional study of prescription errors was carried out in the extra-mural dental prescriptions brought by the patients attending the Dental Outpatients Department of the M.M College of Dental Sciences & Research (M.M.C.D.S.R), Ambala, Haryana. The study period ranged from 1ˢᵗ September, 2013 to 1ˢᵗ December, 2013. Microsoft Excel was used for data analysis. The WHO guidelines for prescription writing were used as a standard while making an assessment of the results.* **Results:** *Most common groups of drugs prescribed by dental surgeons were NSAIDs, antimicrobials, antiseptics and multivitamins. NSAIDs- 86%; Antimicrobials- 85%; Antiseptics- 8.6%; Multivitamins- 12.3%. The average number of drugs prescribed per patient was 3 and the average number of antimicrobial prescribed per patient was 1. Most of the prescriptions analyzed, showed polypharmacy, illegible handwriting, lack of necessary details pertaining to the patients (address, weight), as well as those pertaining to the prescriber (signature, contact details, registration number) and necessary instructions for the patient regarding taking prescribed drugs and advice for follow up. In the extramural prescriptions analyzed, the most common error was prescription of "drug without dose" (30 %).* **Conclusions:** *Routine dental prescriptions exhibit large number of easily identifiable errors which are preventable. The need of the hour is to promote rational drug prescribing practices among dentists, encouraging them to detect and report prescription errors encountered by them. This approach will enrich our existing research base about this hitherto neglected domain of dental practice thereby helping us in developing and implementing effective strategies to combat this menace of prescription errors.*

Keywords: *Prescription error, Dentists, Cross-sectional study, Extra-mural prescriptions*

Introduction

The issue of medication prescribing errors received little attention until 1962, when Barker and McConnell in the United States of America (USA) first demonstrated that medication errors occur more frequently than suspected. They estimated a rate of 16 errors per 100 doses[1] and suggested that the apparent increasing rate of prescribing errors was proportionate to the increasing number of drugs that

were available. As the awareness about the potential implications of prescription errors grew, dedicated systems for reporting medication errors were set up in the USA and Europe.[2,3] Health care professionals who encounter actual or potential medication errors were encouraged to report them confidentially or anonymously if preferred. In 1995, a multidisciplinary group of 17 national organizations formed the National Coordinating Council for Medication Error Reporting and Prevention. The National Coordinating Council for Medication Error Reporting and Prevention defines a medication error as any pre-ventable event that may cause or lead to inappropriate medication use or patient harm, while the medication is in the control of the health-care professional, patient, or consumer.[3]

Prescription errors are reported to be quite frequent in clinical practice.[4] A survey from Italy had revealed that overall 23.9% of prescriptions were illegible and 29.9% of prescriptions were incomplete.[4] A similar survey from Rosa et al reported that on an average, 3.3 errors were observed in each prescription order form.[5] Most of the prescription errors were due to omissions of dosage, administration route, and length of treatment and may potentially cause harm to the elderly outpatients. Even advanced nations like UK had reported 15% of the prescription to be containing one or more errors in critical care units.[6]

Adverse drug events and prescription errors have received extensive study recently in a variety of clinical population, though compared to many other areas relatively little work has focused on this area in dentistry.

A comprehensive study from India reporting the lacunae in the prescription writing trends of dentists have been lacking. The present study was undertaken to understand the current prescription writing practices among dentists and to detect the common errors in them at a tertiary level dental care centre situated in Ambala, Haryana.

Aims and Objectives

1. To Analyze current prescription writing practices among Dentists
2. To identify and quantify various types of medication errors in Dental prescriptions.

Material and Methods

A cross-sectional study of prescription errors was carried out in the extra-mural Dental prescriptions brought by the patients attending the dental outpatient's department of the M.M. College of Dental Sciences and Research (M.M.C.D.S.R), Ambala, Haryana. The study period ranged from 1st September, 2013 to 1st December, 2013.

Data collection

The data obtained was entered into a semi structured proforma. The proforma had four parts. Important information regarding the patient, doctor, drug and the overall impression of the prescription were recorded in these four parts separately. Patient's details that were sought included the name, age, sex, weight and address. The prescriptions were further checked for the following details of the prescribing authority: name, qualification, complete address, phone/mobile number, signature and registration number of the doctor. The drug name, dose, frequency and route of administration, instructions and follow up advice to patient were recorded. The overall clarity, readability, presence of date was included in a separate section of the proforma. The details pertaining to the patients and the doctors were kept confidential. The WHO guideline[7] for prescription writing was taken as a standard while making an assessment of the results.

Operational definitions and classification system used in our study:

Prescription Error

For the purpose of the study, following operational definition of "prescription error" was used: "A clinically meaningful prescribing error occurs when, as a result of a prescribing decision or prescription writing process, there is an unintentional significant (1) reduction in the probability of treatment being timely and effective or (2) increase in the risk of harm when compared with gener-ally accepted practice."[8]

Classification of prescription errors[8,9,10,11]

The prescription errors can be categorized as follows:
1. **Illegible prescription:** any item of medical prescription in which information was illegible.
2. **Prescription with duplicate item:** one or more drugs prescribed more than once to

the same patient taking the dosage into account.

3. *Drugs with the same indication:* prescription of two or more drugs with the same indication keeping in view the respective mechanisms of action.

4. *Wrong frequency:* prescription of a drug with a frequency not consistent with literature.

5. *Drug without administration route:* prescription of a drug with no mention of administration route.

6. *Drug without doses:* prescription of a drug without a specified dose or dosage.

7. *Dose higher than recommended:* prescription of a drug at a dose higher than the one mentioned in literature.

8. *Wrong drug:* prescription of a wrong drug.

9. *Wrong dose:* prescription of a drug with inexistent dose, according to the literature.

10. *Drug-drug Interactions:* prescription with potential drug-drug interactions or incompatibilities.

11. *Prescriber signature missing*

12. *Abbreviated and non standard drug names*

13. *Error prone abbreviations, symbols and dose designations*

The Drug Drug interactions were checked using Medscape drug interaction checker.[12]

Statistical Analysis

Microsoft Excel was used for data analysis. The WHO guideline[7] for prescription writing was used as a standard while making an assessment of the results.

Results

Out of the 100 patients, 61 were male patients. The age distribution showed that 25 patients were below the age of 18 years; 20 patients were in the 18-60 years age group and 55 patients were over 60 years of age.

Most common groups of drugs prescribed by dental surgeons were NSAIDs, antimicrobials, antiseptics and multivitamins. NSAIDs-86%; Antimicrobials-85%; Antiseptics-8.6%; Multivitamins-12.3%. The average number of drugs prescribed per patient was 3 and the average number of

antimicrobial prescribed per patient was 1. Most of the prescriptions analyzed, showed polypharmacy, illegible handwriting, lack of necessary details pertaining to the patients (address, weight), as well as those pertaining to the prescriber (signature, contact details, registration number) and necessary instructions for the patient regarding taking prescribed drugs and advice for follow up. In the extramural prescriptions analyzed, the most common error was prescription of "drug without dose" (30 %).

Date of consultation was clearly written on 99%prescriptions. The name, age and sex of the patient were mentioned in majority of the prescriptions (Table 1). None of the prescriptions analyzed had mention of address and weight of the patient. The name of the prescribing doctor was found in 84 % of the prescriptions analyzed. Qualification of the prescribing authority was missing in more than half of the prescriptions, while details like address and telephone/mobile numbers were mentioned in only about one-fourth of the prescriptions (Table 1). Over 86 % of the prescriptions had signature of the prescribing authority, registration number was not mentioned in over three-fourth of the prescriptions. None of the prescriptions had mention of generic names of drugs. Details like strength, route of administration and duration of treatment was clearly mentioned in over 80 % of the prescriptions. The dose 'of the drug was clearly written in only 67 % of the prescriptions

Table 1. A representation of patient and prescriber/doctor information on the 100 prescriptions analyzed

	Yes n (%)	No n (%)
Patient		
Name	100 (100)	0 (0)
Age	90 (90)	10 (10)
Sex	95 (95)	5 (5)
Address	0 (0)	100 (100)
Weight	0 (0)	100 (100)
Prescriber/Doctor		
Name	84 (84)	16 (16)
Qualification	45 (45)	55 (55)
Address	25 (25)	75 (75)
Telephone/Mobile Number	15 (15)	85 (85)
Signature	86 (86)	14 (14)
Registration Number	25 (25)	75 (75)

Table 2. A representation of drug information on the 100 prescriptions analyzed

	Yes n (%)	No n (%)
Name		
Brand	100 (100)	0 (0)
Generic	0 (0)	100 (100)
Strength	80 (80)	20 (20)
Dose		
Clearly mentioned	70 (70)	30 (30)
Correct	48 (48)	52 (52)
Route of Administration	80 (80)	20 (20)
Duration	75 (75)	25 (25)
Instructions for Patients	43 (43)	57 (57)
Advice for follow up	10 (10)	90 (90)

while it was correct only in 45 % of total prescriptions. More than half of the prescriptions did not contain instructions for patients while the advice for follow up was missing in over 90 % the prescriptions (Table 2).

A total of 13 types of errors were detected in the 100 prescriptions analyzed and these are illustrated in the table 3 with their respective frequencies. A significant number of the prescriptions (27%) were written in illegible handwriting.

In the 100 extramural prescriptions analyzed, among the various categories of prescription errors identified, the most common error was prescription of "drug without dose" (35 %) followed closely by "the use of Error prone abbreviations, symbols and dose designations" (30%). The least common prescription error was the prescription of a "wrong drug" (3 %). (Table 3)

(Most of the prescriptions analyzed had more than more than one category of prescription errors and therefore the total number of identified prescription errors is more than the total number of prescriptions analyzed)

Discussion

This study was an attempt to find out the existing pattern of prescription writing among dentists and to identify as well as to quantify various types of prescription errors in them.

The concurrent use of multiple psychoactive medications in a single patient, i.e. polypharmacy was clearly evident in almost all of the prescriptions analyzed. It is considered to be an increasingly common and debatable contemporary practice in

Table 3. Respective frequencies of various categories of prescription errors found in 100 prescriptions analyzed

Category of Prescription Error	Observed Frequency %
Illegible prescription	27
Prescription with duplicate item	16
Drugs with the same indication	15
Wrong frequency	4.5
Drug without administration route	20
Drug without doses	35
Dose higher than recommended	14
Wrong drug	3
Wrong dose	13
Drug-drug Interactions	4
Prescriber signature missing	8
Abbreviated and non standard drug names	8
Error prone abbreviations, symbols and dose designations	30

clinical practice. Concerns with polypharmacy include the possibility of cumulative toxicity[13] as well as adherence issues which emerge with increasing regimen complexity.[14] There is a need to develop evidence-based strategies for polypharmacy to avoid most of the above mentioned problems.[15] There was a relative lack of information about the patient and prescriber in the prescriptions analyzed. The date of writing the prescription was missing in 4 % of the prescriptions which was considerably lower than the rates of 56.1 % reported by Calligaris et al. [4] Illegible handwriting was identified in 22 % of the prescriptions which was comparatively higher than the rates suggested by studies conducted in the US (10%)[16] and the UK (15%).[17] Among reasons offered by doctors for poor handwriting, heavy workload was the most common.[18] All the prescriptions analyzed had the name of the patient, a finding similar to that of Irshaid et al[19] while the mention of the age (90 %) and sex (95 %) of the patient in our study was considerably higher than that in the above mentioned study. Details of address and weight of the patients was absent in all the prescriptions. Information about address is important to decide when patient is to be called for follow up. Weight of the patient determines the actual quantity of the drug per dose and hence it must be mentioned in the prescription.

As regards the information regarding the prescriber, plenty of deficiencies were identified. 18

% of prescriptions did not bear the name while more than 50% did not mention the qualification. Address details of the doctor were not available in three-fourth of the prescriptions while 85%. did not have any mention of the telephone/mobile number of the doctor. Signature of the prescribing authority was missing in 8 % of the prescriptions; only one-fourth of the prescriptions mentioned the registration number of the prescribing person. The lacunae in providing these details can be considered a violation of WHO guidelines on prescription writing.[7] The study from Saudi Arabia revealed 16.7% of prescriptions deficient in the prescriber's name and 18.1% deficient in the prescriber signature.[19] These findings are distinctly in contrast with the results of our study. Doctor's complete address details are important as the patient/caregiver may need to contact him/her during an emergency. Not mentioning qualification of the prescriber raises doubts about his/her credibility. Generic name of the drugs was not mentioned in any of the prescriptions analysed, a finding consistent with glaringly uncommon rates of mention of generic names in prescriptions in the studies by Irshaid et al[19] and Pandey et al.[20] In our study, less than half of the prescriptions had mention of instructions for the patients, while advice for follow up was missing in most of them (90 %).In the study by Irshaid et al [19] almost 90 % of the prescriptions had partial instructions for the patient. Prescription of drug without dose was observed to be the most common prescription error with a frequency of 35%. In our study, use of abbreviated and non standard drug names (8%) and error prone abbreviations, symbols and dose designations (30%) appeared as one of the major categories of prescription error. These findings are in contrast to the results of Sapkota et al[21] who in their study on prescription error in elderly found considerably rates of 11.76% for use of non-standard drug names and 0.65 % for use of error-prone abbreviations, symbols and dose designations. The least common prescription error was the prescription of a wrong drug (2%), a finding similar that reported by Pote et al.[22]

Our study had a few limitations. The design of our study was cross-sectional; the sample for the study was not homogenous; and the sample size was small. However, despite these limitations, the study has provided valuable insights into the existing prescription pattern among dentists and the glaringly high prevalence of identifiable prescription errors which are essentially preventable.

Conclusions and Future Directions

The drug prescription pattern observed in our study suggests the need to promote rational drug prescribing among clinicians in general and dentists in particular. A high number of prescription errors were found. Whilst many of these were minor and unlikely to have had serious consequences, some were of potentially great significance and may represent only the tip of iceberg. Prescription errors are a source of considerable mortality, morbidity, and health-care costs in the world today but the important thing is that they can be prevented. Educational intervention programs and computer aided prescription order entry can substantially contribute in the lowering of such errors. Prospective observational studies with robust methodology are needed to more accurately determine the frequency of prescription errors in dentistry.

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