

# Medical Errors in Dentistry, Improving by Knowing and Accepting the Reality

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## Abstract

**Background:** A medication error is defined as "any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the healthcare professional, patient, or consumer." In dental practice, medical errors can occur during various stages of the medication process, including prescription, storage, preparation, treatment, and use. **Aim:** This study aims to investigate the occurrence rate of medical errors in dental practice and identify factors contributing to their preventability. **Study Design:** This is a retrospective cross-sectional study. **Method:** Data were collected from the dental records of patients treated at the University Dental Clinics of Tirana, Albania, between January and June 2023. **Results:** Of the records analyzed, 390 (90%) contained at least one medical error. The frequency of errors ranged from 1.0 to 2.5 errors per record. The most common types of errors were "Transcription of prescriptions" (88%), "Prescription errors" (78%), and "Administration errors" (68%). Antibiotics were specifically examined due to concerns about adverse reactions and antibiotic resistance. The Pearson correlation coefficient for antibiotics was significantly greater than 0 but less than 1. **Conclusion:** Medical errors are prevalent in dental drug prescriptions. Understanding the types of medical errors and their contributing factors is crucial for optimizing therapy and ensuring patient safety. This study highlights, for the first time in the Albanian dental community, the need to document and address medical errors.

**Keywords:** medical errors, dentists, prescriptions, interactions, patient's safety

## Introduction

*Primum, non nocere* – First, do not harm. This motto of Hippocrates has guided medical practice for centuries and has gained renewed significance in recent years as awareness of the potential harms caused by medications during various treatments has grown. Advances in healthcare have significantly reduced mortality and morbidity rates, with improvements in clinical predictions and medical services leading to longer life expectancies.

A medication error is defined as “any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is under the control of a healthcare professional, patient, or consumer” [1]. Today, the importance of prescribing the right medication to the appropriate patients based on accurate diagnoses is paramount. Issues related to rational prescribing are critical concerns within the healthcare system that demand attention from dentists. In dental practice, medical errors can occur at any stage of the medication process—whether in prescription, storage, preparation, treatment, or usage. Often, these errors not only result in drug interactions but also pose significant risks to health by affecting treatment efficacy, and leading to adverse effects [2, 3, 4]. Unsafe medication practices and errors are major contributors to injury and preventable harm in healthcare systems worldwide, with an estimated global cost of \$42 billion USD annually. Errors can happen at various stages of the medication use process. *Medication Without Harm* initiative, aimed to reduce severe preventable medication-related harm by 50%, globally in the next 5 years being formally launched at the Second Global Ministerial Patient Safety Summit in Bonn, Germany on 29 March 2017 [5].

Dentists represent the second-largest group of prescribers globally, including in Albania, where they prescribe a wide range of medications such as antibiotics, anti-inflammatory drugs (NSAIDs), antiseptics, and anesthetics. Consequently, errors are a common aspect of dental practice. Prescribing errors include mistakes or inaccuracies in treatment selection, such as incorrect dosages or illegible prescriptions. These errors can manifest in various forms, often involving incorrect dosages, unclear details, or the prescription of inappropriate medications that may react with other medications or drugs during co-administration. Incorrect prescriptions can lead not only to financial losses for patients but also to adverse health effects [6, 7, 8]. Studies have shown that adverse drug reactions rank as the fourth leading cause of mortality in developing countries [9].

Implementing a study on prescription practices serves as a surveillance method which can be very useful to mitigating the burden of medication errors, enhancing patient recovery and discharge rates. Given the inevitability of human error, the most effective way to minimize medication errors is through thorough review and correction of prescriptions prior to dispensing [10]. Research by Mendonca et al. found that one-fourth of prescriptions written by dentists were illegible [11]. Nezafati et al. reported that 98.05% of written prescriptions by dentists have errors [12], while

Ogunbodede et al. identified various types of errors related to dosage, frequency, and duration of drug use in dentists' prescriptions [13].

This study focuses on evaluating medical errors within the Albanian dental community. To date, no previous studies on this issue have been conducted in Albania, with only one related study examining medical errors in hospitalized patients under medication [14]. Dentists typically limit their prescriptions to short-term drug therapy or specific medications for dental procedures, yet evidence suggests that many dentists lack adequate medical knowledge, which contributes to prescription errors [15]. Usually, drug classes prescribed by dentists include antibiotics, analgesics, antifungals, and antivirals. Currently, as much as 80% of prescriptions may be deemed unnecessary for both therapeutic and prophylactic purposes [16, 17]. For instance, antibiotics, the most prescribed class of medications by dentists, can cause harm through inappropriate or unnecessary prescribing, contributing to the global public health issue of antimicrobial resistance, which currently accounts for around 700,000 deaths annually and could escalate to 10 million by 2050 [18].

Despite the high prevalence of medication errors in dental practice globally, there is a notable lack of research focusing on this issue within the Albanian context. The purpose of this study is to investigate the incidence of medical errors in dental practice and to identify factors that could help in their prevention. While medical errors are an inherent part of treatment, identifying the occurrence and preventable factors of medication errors in dentistry, it will enhance patient safety and contribute to improving clinical practices in Albania. This study also aims to situate Albanian practices within a global framework, drawing comparisons with international data on medication errors in dental practice.

## **Material and Methods**

Our research paper presents a retrospective cross-sectional study. Data were collected from the dental records of patients at one of the University Dental Clinics in Tirana, Albania, during the period from January to June 2023. We analyzed these records for the presence of medication errors in dentists' prescriptions.

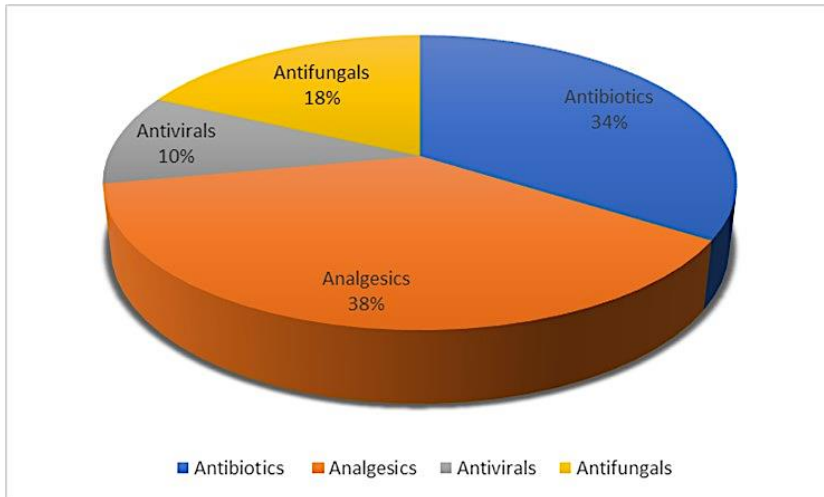
In the literature, various approaches exist for classifying medication errors. Classifications can be based on contextual criteria, such as time, place, medication, and people involved; modal criteria, which explain how errors occur (e.g., wrong medication, dose, frequency, and administration route); psychological theories that categorize errors as occurring from mistakes in planning actions or execution of appropriately planned actions; or by the degree of severity [1, 19, 20, 21, 22].

In this study, we classified medication errors according to ASHP guidelines. Out of a total of 434 dental records, we identified 390 with at least one medication error. We also evaluated the frequency of these errors, and the data were statistically analyzed using SPSS 23.

## Results

From all dental records, in total 434, we identified 390 (90%) with at least one medical error. In our study a high frequency of medication errors was found in the dental records. The prescriptions that we analyzed were for the therapeutic group presented in Figure 1.

**Figure 1.** Therapeutic class of medicines studied for medication errors



The frequency of errors in the 390 charts analyzed ranged from 1.0 to 2.5. We found that each record contained more than one type of medical error, which did not always account for adverse reactions related to the medication. The distribution of medication errors, categorized by type of error, is presented in Table 1.

**Table 1:** Distribution of medical errors.

Types of medical errors	%
Prescription errors	78
Transcription of prescriptions	88
Preparation and distribution	0*
Administration errors	68

(\* ) Preparation and distribution were not identified in the study.

Table 2 presents a detailed observation of the medical errors encountered, indicating the specific points at which each error occurred, expressed as percentages. The

highest frequencies are associated with four key processes: the use of abbreviations and handwritten drug names, alterations in dose (either decrease or increase), and errors related to the timing and dosage of medication.

**Table 2.** Detailed results of medication errors

<b>Types of medical errors</b>		<b>Results</b>
1. Prescription errors	1.1 Wrong drug (e.g. drug not suitable for this indication).	15%
	1.2 Correct drug, wrong patient (e.g. Ignoring contraindications, drug-drug interactions or allergies)	8%
	1.3 Wrong galenic form (e.g. tablets in a patient not able to swallow or refuse, like children)	11%
	1.4 Wrong dose	44%
2. Transcription of prescriptions (e.g. dentist-nurse)	2.1 Usage of abbreviations	68%
	2.2 Oral prescriptions	20%
3. Preparation and dispensing errors (correct prescription)	3.1 Calculation error, preparation error	0%
	3.2 Dispensing (e.g. wrong patients, wrong drug)	0%
4. Administration errors	4.1 Wrong dose	2%
	4.2 Wrong administration time	35%
	4.3 Omitting error, additional dose	31%
	4.4 Wrong handling of drugs during applications (e.g. injectables)	0%
	4.5 Wrong infusion rate	0%

In our study, we evaluated antibiotics as the second most prescribed medication by the dentists (34%), (see Graph 1), for potential adverse reactions during treatment considering also the risk of developing antibiotic resistance. We applied the Pearson correlation coefficient for antibiotics, which was significantly greater than 0 but less than 1. These results are presented in Table 3.

**Table 3.** Medical errors with adverse reaction (antibiotics)

Medical errors	Adverse effects
Pearson correlation coefficient (r)	0.137
p (value)	0.005
N	390

## Discussion

The literature reviewed for this study identifies several situations in dentistry that are classified as medical errors, including: errors in providing and prescription of medication, errors during treatment, neglect of scientific evidence regarding treatment, inadequate maintenance of patient records, misdiagnosis, and failure to prevent complications associated with care [23]. The occurrence of these errors is influenced by various factors, with the pharmacological knowledge of medical personnel—such as dentists and nurses among others—being particularly critical.

In our study, we focused on potential medication errors documented in dental records after treatments. Our data revealed that most errors were related to the transcription of prescriptions (88%). Among these, 68% involved the use of abbreviations and poor handwriting, while 20% were due to oral prescriptions, primarily concerning analgesics. Improper prescriptions using abbreviations or poor handwriting of medicines are medical errors referred also from other studies [24] with significant implications for patient safety. To mitigate such errors, transitioning from paper-based to electronic systems has been recommended, and suggested by Salmasi et al. [25], as *Step 4* of a progressive stepwise approach to prevent medication errors, by healthcare professionals. As this study shows, dentists are not exempt from these types of errors; therefore, implementing computerized prescriptions could be a valuable option for them. Currently, electronic prescriptions are not available for dentists in Albania, although they are accessible to physicians. Implementing electronic prescribing could significantly reduce transcription errors.

The second most frequent category of medical errors involved medication administration. The most common error identified was “wrong administration time” (35%), followed by “omission of additional doses” (31%) (see Table 2). Despite the varying percentages of errors in drug administering, their high rates indicate an increased risk of adverse drug events, especially with antibiotics. Antibiotics are one of the most frequently prescribed drug categories by dentists, which according to FDI are responsible for about 10% of antibiotic prescribing in humans [26, 27]. Improper antibiotic use can lead to antibiotic resistance, adverse effects, and decrease in

antibiotic prophylactic activity, making it essential for dentists to prevent such issues. Our study found that in 31% of cases, there were mistakes in the omission or addition of antibiotic doses during treatment. Generally, the basic medication protocol should remain unchanged, except in emergencies. Any alterations must be supported by a written explanation. Switching antibiotics between different pharmacological classes is discouraged, as it can compromise treatment efficacy and safety, leading to resistance [28].

Another error identified was prescribing the “wrong dose”. In almost all dental records, prescriptions were made without a standardized unit of weight, particularly for children and elderly patients. Factors related to the patient, such as age, weight, allergies, and comorbidities, must be considered. It is also essential to address the presence of immunosuppressive medications, recent antimicrobial exposure from infections or colonization, and chronic organ failure (renal or hepatic dysfunction) [29]. Although prescriptions should be made in grams according to established standards, our study found that most drugs were prescribed in milligrams or units. These prescriptions were often guided by the manufacturing companies rather than adherence to standards. Additionally, errors were noted in the documentation of doses, such as  $\frac{1}{2}$  or  $\frac{1}{4}$ , which could lead to incorrect dosage intake due to potential incorrect division of pills.

The Body Mass Index (BMI), and the medication, accordingly, should be noted in any prescriptions and their absence from the patients’ records can be considered a medical error, especially for vulnerable groups such as children, elderly, and people with specific diseases [30]. Antibiotics are very well studied drugs with pharmacokinetic parameters such as distribution volume that can be different in adults or obese patients [31]. Obese people have different distribution volumes, and they need drug doses to be calculated. Antibiotic administration can be influenced by different pathophysiological conditions, morphological changes, or effects of aging as well, which should be considered especially in elderly patients [32].

The error of “wrong administration time” was found in 35% of analyzed records. In these cases, the administration time were not documented, only the regimen, which increases the risk of drug-drug interactions. Dentists often use abbreviations like “3 x 1” or “2 x 1” without adequately informing patients about the required timing for taking their medication (every 8 hours and every 12 hours) and advising the patients about the time of administration. Some foods and drugs, when taken together, can alter the body's ability to utilize a particular food or drug, or cause serious side effects, therefore it is advisable for patients to adhere to their physician's and doctor's instructions to maximize benefits while minimizing food-drug interactions [33]. It is important to advise patients on the timing of medication administration in relation to meals, as the potential for drug-food interactions increases. Pills should be taken with water and at least 30 minutes apart from meals, especially for  $\beta$ -lactams, which are very sensitive chemical substances.



In our study, most medical errors were observed in the transcription and/or interpretation, administration, and prescription processes. Errors related to “preparation and dispensing” were not observed (0%). Their absence as possible medical errors can be explained by the fact that they could not be observed in the patients’ written records. It’s critical that all therapeutic procedures and medication administrations or prescriptions are documented in dental records, as these serve as legal documents. Failure to document procedures can lead to medical malpractice and errors.

A small percentage (8%) of “correct drug, wrong patient” errors was also noted. This issue is particularly relevant in university clinics becoming object of scientific discussions between dentists and pharmacists. Improved coordination on this topic is essential, since differing medical behaviors toward a drug in various patients, even when the drug is appropriate, pose significant challenges. Incomplete or missing information about patients’ sensitivities to certain chemical compounds and antibiotics can complicate treatment decisions. The lack of a comprehensive patient database in the primary healthcare system increases the risk of these errors. Our study found no written notes in the records regarding these situations. We believe that the changes made during treatments, such as 'omitting errors' and 'additional doses' (31%), may be attributed to this lack of documentation. Failing to document these cases results in missing data, hindering efforts to improve practices. Not documenting these cases means that the problems related to the drug are not solved and the cases are repeated [34].

Although the “wrong galenic form” error was noted at a moderate rate (11%), it was found in cases where more appropriate medication forms could have been used. Our findings showed that most prescriptions did not specify the type of tablet (e.g., extended-release, retard, standard), and some solutions lacked proper galenic forms related to viscosity. We used Pearson correlation coefficient to evaluate antibiotics and possible adverse reactions during treatment. The results showed a significant correlation ( $r = 0.137$ ), indicating that medical errors are preventable and that an increase in errors can lead to more adverse drug reactions

## **Conclusion**

This study highlights the high prevalence of medication errors in the Albanian dental community, with 90% of analyzed dental records containing at least one error. The findings underscore critical issues in prescription practices, particularly concerning transcription errors and improper administration of medications. The high rates of errors, especially related to dosages and timing, point to significant gaps in the pharmacological knowledge among dental practitioners.

As dentists are pivotal prescribers of medications, including antibiotics and analgesics it is crucial to enhance their training and awareness regarding safe prescribing practices. The absence of electronic prescribing systems in Albania is a



significant barrier to reducing transcription errors. Transitioning to computerized prescriptions could improve accuracy and patient safety. Moreover, the study reveals that the lack of detailed documentation increases the risk of errors, complicating treatment decisions and increasing the potential for adverse drug reactions. Creating a comprehensive patient database within the primary healthcare system could mitigate these risks and promote better coordination of care among healthcare providers.

Overall, this research calls for immediate attention to improving prescription practices in dental settings to enhance patient safety and minimize preventable harm. Further studies are needed to explore effective interventions and monitor the impact of changes in prescribing protocols on medication error rates in Albanian dental practice.

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