

Antibiotic Prescribing in Dental Clinics in Vietnam

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Date of Submission: 20-01-2025

Date of Acceptance: 30-01-2025

ABSTRACT: This study aims to assess the current prescribing practices of antibiotics in dental practice in Vietnam. Data were collected in a prospective study from 107 dentists working at dental clinics in Vietnam. Information was gathered through an online questionnaire via Microsoft Forms, which included general information about the dentists, patients' infection status, and images/copies of prescriptions. A total of 458 prescriptions were collected, of which 312 (68.1%) were related to odontogenic infections, surpassing the 130 prescriptions (28.4%) associated with procedures or surgeries. Most prophylactic antibiotics were prescribed after interventions. The most prescribed antibiotic was spiramycin combined with metronidazole (39.5%), followed by co-amoxiclav (33.8%) and amoxicillin (11.8%). Up to 87.7% of dentists selected antibiotics based on their knowledge and experience. Most prescriptions in the study had dosages, dosing intervals, and duration of use that were consistent with manufacturer recommendations and current guidelines. However, prophylactic antibiotics are generally recommended for administration before procedures or surgeries rather than after. Additionally, the preference for prescribing single-agent antibiotics over combination antibiotics for the treatment of oral infections should also be considered. The current antibiotic prescribing practices in dental clinics in Vietnam still show inconsistencies and are not entirely aligned with existing guidelines and recommendations. Given the variations in pathogenic bacterial strains and antibiotic resistance patterns across different regions, further studies are needed to optimize antibiotic use to ensure safety and effectiveness.

KEYWORDS: antibiotic, dental practice, dental clinic, prescription.

I. INTRODUCTION

Antibiotic resistance is currently one of the most pressing public health concerns worldwide [1]. The increasing resistance to antibiotics has become a significant threat to the effectiveness of preventing

and treating infections caused by viruses, bacteria, fungi, and parasites. There have been warnings that the world is entering a "post-antibiotic era", in which even common infections could become fatal due to the rise of drug-resistant bacteria, while the development of new antibiotics remains limited [1]. The primary cause of antibiotic resistance is the irrational use of antibiotics, influenced by multiple factors such as a lack of regulatory oversight in antibiotic distribution, inconsistencies in antibiotic use guidelines across different regions, excessive and inappropriate antibiotic prescribing by physicians, self-medication by patients, and the overuse of antibiotics in animal husbandry and agriculture [2][3][4].

In dental practice, systemic antibiotic use is an appropriate approach to supporting local dental interventions in controlling oral infections. However, antibiotic prescribing in dentistry is largely based on the knowledge and experience of dentists due to the limited scientific evidence in global medical literature and the absence of specific guidelines for antibiotic use in dentistry. The inappropriate prescribing of antibiotics has become a growing concern, as the number of antibiotic prescriptions continues to rise. In fact, dentists rank second only to internal medicine and surgical specialists in terms of antibiotic prescribing volume [5][6]. Studies from Canada, Australia, the United States, and Belgium indicate a significant increase in antibiotic prescribing rates among dentists [6][7][8][9]. In Canada, the proportion of antibiotic prescriptions by dentists steadily increased from 1996 to 2013, while prescriptions by physicians declined [6]. Similarly, antibiotic prescriptions in Australian dental practice surged by 50% between 2001 and 2012 [8]. Another study in the U.S. reported that 80% of prophylactic antibiotic prescriptions by dentists were unnecessary [7]. Several factors contribute to this trend, including a lack of information on antibiotic resistance, the absence of unified guidelines for dental practice from regulatory authorities, and delays in updating recommendations for prophylactic and therapeutic antibiotic use in dentistry. On the dentists' side,

concerns about preventing infectious complications, lack of confidence when managing patients with systemic diseases, and hesitation when performing invasive procedures such as dental implants or bone grafting have also contributed to the increasing use of antibiotics [10][11][12].

In Vietnam, no official guidelines on antibiotic use in dentistry have been established. Furthermore, research on antibiotic prescribing in dental practice remains limited in recent years [13][14][15]. To date, no study has investigated antibiotic prescribing practices in dental clinics, despite ongoing advancements in international guidelines for antibiotic use in dentistry. Therefore, this study was conducted to assess the current antibiotic prescribing practices of dentists. The findings will serve as a basis for proposing measures to enhance

the effectiveness of antibiotic prescribing in dental practice across Vietnam.

II. SUBJECTS AND METHODS

2.1. Study sample

The study sample consisted of dentists working at private dental clinics in Vietnam. According to the sample size formula, a minimum sample size of 62 was required to ensure a 95% confidence level, with an acceptable margin of error of 0.1, assuming that 80% of dentists prescribe antibiotics appropriately [16]. Between March and September 2024, a total of 107 dentists agreed to participate and signed the informed consent form. Table 1 presents some characteristics of the study sample.

Table 1- Characteristics of the dentists participating in the study

Characteristics		n	%
Sex	Male	73	68.2
	Female	34	31.8
Years of practice	Less than 5 years	43	40.2
	5 – 10 years	25	23.4
	More than 10 years	39	36.4
Main specialty	General practice	56	52.3
	Implantology	9	8.5
	Periodontics	13	12.1
	Surgery	20	18.7
	Others	9	8.4
Area	Ho Chi Minh City	52	48.6
	Ha Noi City	32	29.9
	Others	23	21.5

2.2. Research instruments

This prospective study utilized the following data collection instruments: informed consent form, patient infection status form, copies of prescriptions.

2.3. Research procedure

1. Invitation and information: Dentists were invited to participate in the study and were provided with details on the research objectives, participation requirements, and consent procedures.

2. Data collection: Participating dentists provided demographic information such as age, gender, years of practice, specialty, participation in continuous education, and antibiotic knowledge updates via an online questionnaire using Microsoft Forms.

3. Prescription documentation: When prescribing antibiotics for infection treatment, the dentists took photographs of prescriptions (with patient names and dentist names redacted if necessary). The

dentists then submitted the prescription images and completed the “Patient infection status form”, also created using Microsoft Forms.

4. Data compilation: The collected prescriptions were analyzed to identify key components of antibiotic prescriptions for infection treatment.

2.4. Data analysis

Data were entered and processed using R software, version 4.1.0. Quantitative variables were presented as means (with standard deviation) or medians (with interquartile range), depending on data distribution. Qualitative variables were expressed as frequencies and percentages.

III. RESULTS

3.1. Diagnosis when prescribing antibiotics

Figure 1 shows the distribution of diagnosed conditions or diseases when dentists

prescribe antibiotics. Of the total of 458 prescriptions, 312 prescriptions (68.1%) were related to infections caused by dental issues, which

was higher than the 130 prescriptions (28.4%) related to procedures/surgeries.

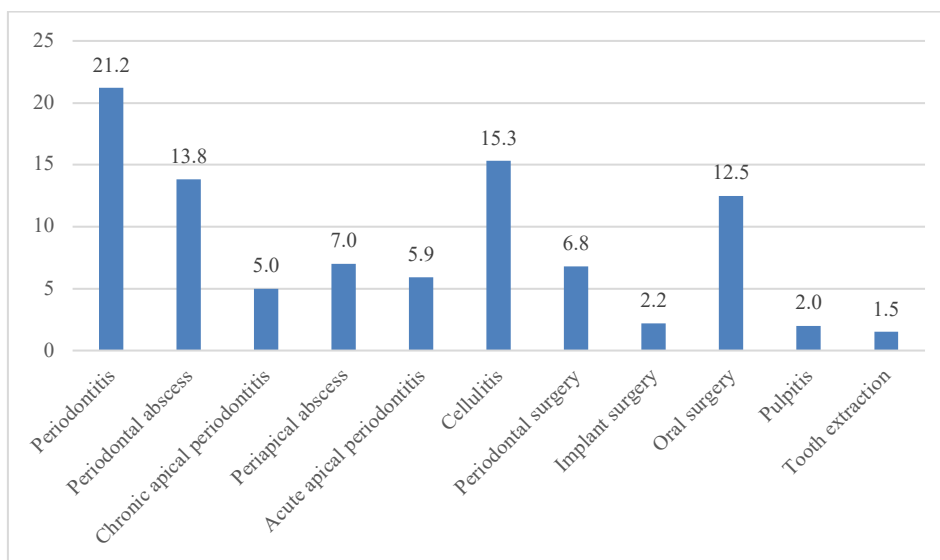


Figure 1- Diagnoses for which antibiotics were prescribed

3.2. Antibiotic usage

According to Figure 2, the antibiotics most often prescribed by dentists were spiramycin combined with metronidazole (39.5%), followed by

co-amoxiclav (33.8%) and amoxicillin (11.8%). Less commonly prescribed antibiotics included cephalosporins (across all three generations) (5%) and co-amoxiclav with metronidazole (7.2%).

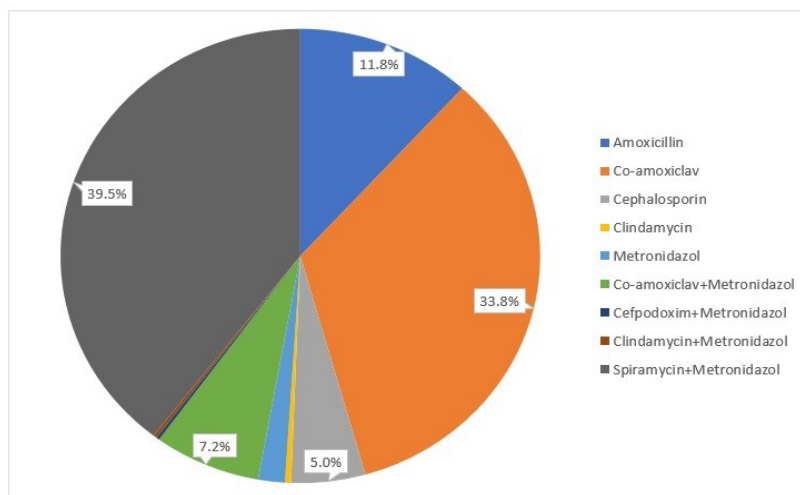


Figure 2- Types of antibiotics prescribed

Table 2 shows that for dental infections, the combination of spiramycin and metronidazole, along with co-amoxiclav, were the most frequently used. Specifically, the combination of spiramycin and metronidazole was prescribed in 74.2% of cases diagnosed with periodontitis, 71.4% for periodontal abscesses, and 39.1% for chronic apical

periodontitis. Co-amoxiclav was used in 53.1% of prescriptions for periapical abscess, 48.1% for acute apical periodontitis, and 32.9% for cellulitis. After surgical procedures, co-amoxiclav was the most commonly prescribed antibiotic. It was included in 71% of prescriptions after periodontal surgery, 50% after implant surgery, and 33.3% after oral

surgeries. Amoxicillin was most frequently used for conditions like pulpitis (77.8%) and tooth extractions (40.6%).

Table 2- Most commonly used antibiotics for each diagnosis

Types of diagnoses	Types of antibiotics	n	%
Periodontitis	Spiramycin+Metronidazol	340	74.2
Periodontal abscess	Spiramycin+Metronidazol	327	71.4
Chronic apical periodontitis	Spiramycin+Metronidazol	179	39.1
Periapical abscess	Co-amoxiclav	243	53.1
Acute apical periodontitis	Co-amoxiclav	220	48.1
Cellulitis	Co-amoxiclav	151	32.9
Periodontal surgery	Co-amoxiclav	325	71.0
Implant surgery	Co-amoxiclav	229	50.0
Oral surgery	Co-amoxiclav	153	33.3
Pulpitis	Amoxicillin	356	77.8
Tooth extraction	Amoxicillin	186	40.6

IV. DISCUSSION

4.1. Antibiotic prescription diagnosis

The majority of antibiotic prescriptions were related to dental infections such as periapical abscess, periodontal abscess, periapical inflammation, and cellulitis, accounting for 68.1%. This was higher than the 28.4% of prescriptions for procedures or surgeries, such as tooth extractions, wisdom tooth extractions, bone spur surgery, biopsies, root-end resections, gingival surgeries, crown lengthening, biological width correction, and implant surgeries. According to Ahmadi et al., antibiotics are prescribed to prevent localized and confined infections, as well as to treat both dental and non-dental infections [17]. Therefore, clinicians tend to prescribe antibiotics for both dental infections and post-procedural cases.

In the study by Mansour et al., systemic antibiotics were primarily considered by clinicians when performing implant surgeries, bone grafts, and tooth extractions [18]. Lodi et al. noted that post-extraction complications often involve infection and osteitis, and the use of prophylactic antibiotics could reduce this risk, on average, prophylaxis in 19 healthy patients could prevent one infection [19]. However, a multi-center study in Malaysia found that the infection rates were low and mild in patients who did not receive antibiotics, casting doubt on the routine use of prophylactic antibiotics [20]. According to Le et al., using amoxicillin before surgery showed similar clinical outcomes to postoperative treatment for lower wisdom tooth extractions [14]. Additionally, systematic reviews concluded that there is no strong evidence to support the routine or daily use of antibiotics to reduce the

risk of post-extraction complications [21][22]. For wisdom tooth extractions, the decision to use prophylactic antibiotics depends on factors such as the depth of the tooth, the need for bone cutting, trauma to surrounding tissues, and post-surgical inflammation. With the increasing prevalence of antibiotic resistance, clinicians should assess whether to prescribe prophylactic antibiotics based on the patient's clinical status and risk of infection complications [19].

For periodontal surgeries, the infection rates are low (0.55% – 2.09%) [23]. Callis et al. conducted a retrospective review of 596 patients undergoing 1078 surgeries, finding that 895 procedures were performed without prophylactic antibiotics, resulting in 17 complications (1.9%), while 183 procedures used antibiotics, with only one complication (0.55%). The difference in complication rates between the two groups was not statistically significant [23]. According to Powell et al., patients who received antibiotics as part of the surgical procedure (before and/or after surgery) had an infection rate of 2.67%, compared to 1.86% in those who did not receive antibiotics, but the difference was not statistically significant [24]. Due to the low infection rate and the potential risks and benefits of antibiotics, routine antibiotic prophylaxis is not recommended in periodontal surgery [21].

Dental implant surgeries are classified as clean-contaminated surgeries. The success rate is high (95% to 99%), and failures are typically associated with surgical trauma, initial instability, or infection [25]. Some early implant failures may result from bacterial infections during the implant procedure, leading to peri-implant infections. These

infections are challenging to manage and can result in significant financial losses. Therefore, prophylactic antibiotics before surgery can reduce the risk of failure [26]. However, studies on this topic have varying biases [26]. Smokers seem to have a higher risk of infection. Although a single preoperative antibiotic dose significantly reduces early implant failure rates, no statistically significant difference in postoperative infections or side effects was observed [27]. Therefore, prophylactic antibiotics may not be necessary for single implants in low-risk patients [28][29]. In more complex cases requiring bone grafting or multiple implants, the potential benefits of prophylactic antibiotics may still be considered, with a single preoperative dose accepted.

The indications for antibiotic prescriptions in this study were aimed at preventing infections after surgical procedures. According to the Ministry of Health of Vietnam, "antibiotic prophylaxis is the use of antibiotics before an infection occurs to prevent it" [4]. The scientific basis for prophylactic treatment is to eliminate or reduce temporary bacteremia caused by invasive procedures [30]. Oral surgeries fall under clean-contaminated procedures and may require prophylaxis. However, prophylaxis should only be used for a short duration before surgery to eliminate bacteria that may enter the surgical site [31]. While the optimal timing of prophylaxis (pre, intra, or post-operative) remains unclear, a single antibiotic dose before surgery can reduce the rate of infections after wisdom tooth extractions [26]. However, this must be balanced with the risks of side effects and antibiotic resistance. For implant surgeries, there is little evidence to support routine postoperative antibiotic use, and therefore it is not typically recommended [26]. In this study, 2 out of 10 implant surgeries were prescribed a single preoperative prophylactic dose, while 8 out of 10 cases received postoperative antibiotics for 5-7 days.

4.2. Antibiotic used

The most commonly prescribed antibiotics in this study align with findings from a 2002 survey by Nguyen on antibiotic usage in dental practice in Ho Chi Minh City, which showed that spiramycin combined with metronidazole was also the most commonly prescribed (44.7%), followed by amoxicillin (20.3%) [32]. In a 2011 study on dental infections in Can Tho City by Tran, the survey results indicated that 81.6% of dentists preferred to prescribe a combination of spiramycin and metronidazole, followed by amoxicillin (65.5%) [13]. Similar studies on antibiotic use in dentistry in

other countries have shown that a single antibiotic, such as amoxicillin, is the most frequently used [33][34][35][36].

Although less commonly used than other antibiotics, cephalosporins from the second (e.g., cefaclor, cefuroxime) and third generations (e.g., cefpodoxime, ceftazidime) were also prescribed by dental practitioners. These antibiotics are listed by the WHO as ones to consider when used [37][38]. They should only be prescribed for severe infections that have not responded to standard antibiotics, to minimize the development of antibiotic resistance. In this study, one patient received 1000 mg of ceftazidime twice a day for a severe infection requiring hospitalization and intravenous antibiotic treatment.

All antibiotics used in this study were broad-spectrum. Broad-spectrum antibiotics affect a wide range of pathogens, including both Gram-positive and Gram-negative bacteria, and are often prescribed when the specific microorganism is unknown. Although narrow-spectrum antibiotics are considered ideal and preferred over broad-spectrum antibiotics [9][39][40], the mixed nature of bacterial infections in dental conditions (including both Gram-positive and Gram-negative bacteria) justifies the choice of broad-spectrum antibiotics by the dentists [13][15][41]. Additionally, in a study on bacterial resistance patterns in Ho Chi Minh City in 2010, Vo et al. found that bacteria had developed high resistance to antibiotics like penicillin, azithromycin, clindamycin, spiramycin, and metronidazole [15]. As a result, co-amoxiclav may be one of the first-choice antibiotics for treating cellulitis and dental infections.

The rate of prescribing antibiotic combinations was also high (47.1%). Shivanand et al. discussed the rationale for using combined antibiotics in dental practice today, suggesting that combination therapy should only be considered when broadening the antimicrobial spectrum is necessary for patients with undifferentiated sepsis, life-threatening conditions, when seeking to increase bactericidal efficacy against specific pathogens, to prevent rapid emergence of antibiotic-resistant bacteria, or to treat certain dental infections [42]. The Ministry of Health of Vietnam recommend combined antibiotics only when it is demonstrated that multiple bacterial species are involved and require a broader spectrum, or when encountering resistant bacteria that necessitate combined therapy, or when long-term treatment is needed to reduce the risk of resistance [4].

Recently, there have been few studies in Vietnam regarding the sensitivity and resistance

levels of antibiotics in dental infections, which limits specific recommendations for dentists on antibiotic selection. The resistance patterns in each country and locality may differ, influencing the clinical experience of dentists in choosing antibiotics.

V. CONCLUSION

In general, antibiotics are prescribed for dental infections and post-procedure or post-surgical cases. Combination antibiotics are used more frequently than single antibiotics. Most of the dosages, dosing intervals, and durations of antibiotic use prescribed align with the manufacturer's recommendations and current guidelines. However, prophylactic antibiotic use is recommended before interventions rather than after, and single antibiotics are preferred over combinations in the treatment of oral infections. The current antibiotic prescribing practices in Vietnam still exhibit some inconsistencies and do not fully align with the recommended guidelines. Given the variation in bacterial strains and resistance patterns depending on the region, further research is needed to ensure the safe and effective use of antibiotics.

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