

Rational Use of Antibiotics in Dentistry: Evidence from Recent Literature and Qualitative Insights into Prescribing Practices

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Abstract

Background: Antimicrobial resistance (AMR) represents a major global public health threat, and inappropriate antibiotic use in dentistry contributes to this burden. Despite the availability of evidence-based clinical guidelines, antibiotic overprescribing remains common in dental practice, driven by a complex interplay of clinical, behavioral, educational, and systemic factors.

Aim: This study aimed to examine the rational use of antibiotics in dentistry by synthesizing recent international evidence and exploring dentists' prescribing behaviors through qualitative analysis.

Methods: A narrative review of literature published between 2021 and 2026 was conducted using PubMed, Scopus, and Web of Science, focusing on therapeutic antibiotic use, prophylactic indications, and antimicrobial stewardship interventions. In parallel, two focus groups were held with nineteen dentists recruited through purposive sampling to ensure diversity in experience, specialty, and practice setting. Discussions were audio-recorded, transcribed verbatim, and analyzed using inductive codebook thematic analysis, with two researchers coding independently.

Results: The reviewed literature indicates that a substantial proportion of dental antibiotic prescriptions remain inappropriate, with limited clinical benefit in many common dental conditions. The qualitative analysis identified four key themes influencing prescribing behavior: (1) patient expectations and misconceptions, (2) defensive medicine and fear of complications, (3) gaps in guideline adherence and reliance on non-evidence-based knowledge sources, and (4) systemic and regulatory challenges. Participants described pressure from patients, uncertainty in clinical decision-making, and barriers related to diagnostic limitations and healthcare system structures.

Conclusions: Inappropriate antibiotic prescribing in dentistry is a multifactorial issue that is not explained by knowledge deficits alone, extending to behavioral and systemic determinants. Effective antimicrobial stewardship is likely to require guideline implementation, behavioral interventions, targeted education, and regulatory reform. Addressing both clinician and patient-related factors appears essential to improving prescribing and mitigating the global impact of AMR. (TCM-GMJ August 2026; 11 (3): P44-P48)

Keywords: Antimicrobial Resistance; Antibiotic Stewardship; Dentistry; Antibiotic Prescribing; Qualitative Research; Focus Group.

Introduction

Antimicrobial resistance (AMR) is one of the most critical global public health crises of our time, frequently characterized as a "silent pandemic" [1]. In 2019, bacterial AMR was directly responsible for approximately 1.27 million deaths globally and was associated with nearly 5 million deaths [1]. Recent projections forecast that without urgent and coordinated interventions, deaths directly attributable to AMR could rise to 1.91 million annually by 2050, with cumulative fatalities exceeding 39 million between 2025 and 2050 [2].

The dental sector is a significant contributor to this crisis, accounting for approximately 10% of antibiotic prescriptions worldwide, and a recent systematic review re-

ported that up to 90% of the prescriptions issued in dental practice may be inappropriate or unnecessary [3]. Analyses of national dental visit data confirm that a substantial proportion of them are unnecessary [4]. Irrational prescribing disrupts the human microbiome and exerts selective pressure on the oral microbiota, and resistance genes are distributed throughout the oral cavity [5]. Furthermore, unnecessary antibiotic use directly compromises patient safety, significantly increasing the risk of adverse drug events, including life-threatening *Clostridioides* difficile infections [6].

Despite the establishment of clear, evidence-based guidelines by the American Dental Association (ADA) and the American Heart Association (AHA), which restrict prophylactic use and advocate definitive dental treatment over systemic antibiotics, provider compliance remains inadequate [7, 8]. The drivers of overprescribing are complex, rooted in clinical uncertainty, patient expectations, and systemic barriers [9]. Georgia combines private dental provision with limited public knowledge of antibiotics: among 1,876 adults surveyed nationally, only

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32.0% correctly identified that antibiotics are ineffective against viral infections [10]. To our knowledge, no study has examined how dentists in Georgia reason about prescribing. This study therefore explores those behavioral drivers through a qualitative focus group approach, providing a foundation for stewardship interventions.

Methods

Literature Review

A narrative review of the literature was conducted using PubMed, Scopus, and Web of Science to identify relevant studies published between 2021 and 2026. Search terms included combinations of "dentistry", "antibiotics", "antimicrobial stewardship", "prophylaxis", and "odontogenic infections". Titles and abstracts were screened for relevance, followed by full-text review of eligible studies. Priority was given to systematic reviews, randomized controlled trials, and clinical guidelines issued by major international organizations. Evidence was synthesized thematically, focusing on therapeutic antibiotic use, prophylactic indications, and antimicrobial stewardship interventions. This synthesis informed the topic guide and the interpretation of the qualitative findings, and is presented in the Introduction and Discussion.

Focus Group

Two focus groups were conducted to explore dentists' attitudes, perceived barriers, and day-to-day practices related to antibiotic prescribing in dentistry.

Participants

Nineteen certified dentists were recruited using purposive sampling to ensure heterogeneity in clinical experience (early-career and experienced practitioners), specialty (oral surgeons, general practitioners, and prosthodontists), practice setting, and location. Twenty-five dentists were approached and six declined. Ten participated in the first session and nine in the second.

Procedure

Both sessions were facilitated by the first author, a dentist experienced in moderating group discussions, using a semi-structured topic guide. Each discussion lasted approximately 90 minutes, was held in May 2026 in Georgian, and covered frequency and indications for prescribing, influencing factors, guideline awareness, patient expectations, and perceived barriers.

Setting

The sessions were held in a private meeting room at the offices of the Georgian Dental Association, closed to non-participants, with no colleagues, employers, or patients present.

Data Collection and Analysis

Discussions were audio-recorded with participants' informed consent and transcribed verbatim. Data were analyzed using inductive codebook thematic analysis. Two researchers, Z.A. and N.G., independently coded the transcripts to identify recurring themes and subthemes. Discrepancies were resolved through iterative discussion until consensus was reached. Themes were defined based on their salience across participants, considering both frequency and contextual importance. The second session generated no substantively new themes. Quotations origi-

nally expressed in Georgian were translated into English by the first author, who is bilingual; no independent back-translation was performed.

Ethics

Ethical approval was granted by the Biomedical Research Ethics Committee of the Georgian Dental Association (GSA-BREC-2026-003, 17 March 2026). All participants provided written informed consent prior to participation.

Limitations

As a qualitative study based on two focus groups, the findings describe how these participants reason rather than how prescribing is distributed across the profession, and are not statistically generalizable. Responses may have been influenced by social desirability bias or group dynamics. The first author moderated, translated, and performed the primary coding, counterbalanced by independent coding but without back-translation.

Results and discussion

The qualitative analysis of the two focus group discussions, involving nineteen dentists in total, revealed a complex interplay of behavioral, systemic, and educational factors influencing antibiotic prescribing. The findings are categorized into four primary themes, summarized alongside illustrative quotations in Table 1.

Patient Expectations and Misconceptions

Patient pressure emerged as one of the contributing factors to inappropriate prescribing. Dentists frequently noted that they often feel a sense of compulsion to prescribe antibiotics due to patient requests and potential limitations in pharmacological knowledge among the public. One practitioner mentioned, "Sometimes I have to write a prescription because I know they will go elsewhere and obtain it anyway" (Participant 1). The expectation for a rapid recovery is further reinforced by patients' past experiences, as noted by another participant: "Patients often tell me: 'Doctor, this helped me last time, and prescribe it for me now too'" (Participant 2). Several participants also described a tendency to equate antibiotics with, for example, analgesics. "A portion of patients believe that antibiotics are painkillers, or they take antibiotics for other reasons during periods of severe pain," (Participant 3) explained. Explaining when antibiotics are not indicated was also difficult: "it is difficult to explain to a person that an extraction performed under sterile conditions does not require any medication" (Participant 4).

Defensive Medicine and Fear of Complications

Risk aversion, commonly referred to as "defensive medicine," was described by participants as heavily influencing their day-to-day clinical decisions. Antibiotics were reported as a defensive measure against potential postoperative complications or unpredictable patient emergencies. "I prefer to play it safe and prescribe, rather than have them call me at night saying their temperature has gone up," (Participant 5) stated. Concerns about being held responsible were explicit within the local context: "In our reality, if a complication occurs and you haven't prescribed an antibiotic, you will be blamed" (Participant 6). High-stakes and high-cost procedures also mattered to

this decision. One dentist noted, "I cannot take risks during implantation; it is an expensive procedure, and I prescribe them with my 'hands tied'" (Participant 7). This extended to prolonged prophylactic courses, with one noting, "After surgical manipulation, I usually give them for at least 3 days for prophylaxis," (Participant 8) and to compensating for patient factors: "When patient hygiene is low, I have no other choice; I try to balance the background with antibiotics" (Participant 9).

Guidelines, Knowledge Gaps, and Diagnostic Barriers

Participants described a marked skepticism toward international guidelines, often rationalizing non-compliance through perceived local biological or environmental differences. "We do read international guidelines, but the immunity and diet of a Georgian patient are different; there are more infections here," (Participant 10) argued. Reliance on earlier academic training and on industry sources rather than on current evidence was also reported. Quotes included, "We were taught this way in university, and I have worked with this scheme for years; it hasn't failed me yet," (Participant 11) and "We get information mainly from conferences and pharmaceutical representatives" (Participant 12). Uncertainty surrounding prophylaxis was evident: "We have vague information about pre-operative prophylactic dosing; some give it before surgery, some after" (Participant 13). Limited diagnostic infrastructure was described as forcing empirical prescribing: "You cannot send the patient for a bacteriological analysis; it is expensive and takes time, so we directly prescribe a broad spectrum" (Participant 14).

Systemic and Ethical Issues

Systemic and regulatory conditions were described as severely undermining individual stewardship efforts. The over-the-counter (OTC) availability of antibiotics was reported to render professional gatekeeping almost obsolete. "They still give them without a prescription in the pharmacy; my prescription sometimes just has a formal character," (Participant 15) noted. This was linked to a cycle of self-medication, forcing dentists to adapt: "Often a patient comes in already having taken Augmentin, and I am forced to let them continue the course" (Participant 16). Participants also described an ethical weighing of the immediate case against the abstract threat of AMR: "I do think about resistance, but in a specific moment, saving the specific patient worries me more" (Participant 17). Finally, the absence of standardized peer practice, "We don't have a unified approach among colleagues; everyone prescribes doses based on their own views" (Participant 18), and of oversight, "There is no strict control and monitoring of antibiotic use in dentistry" (Participant 19), were reported.

The findings from the focus groups provide insight into the various factors associated with antibiotic overprescribing in dentistry, aligning with international patterns while reflecting specific local conditions. The responses indicate that prescribing behavior is not explained by a knowledge deficit alone; instead, knowledge-related, psy-

chological, cultural, and systemic factors appeared together and argue for a comprehensive response.

Patient expectations and misconceptions represent a significant barrier to rational antibiotic prescribing. Participants noted that patients often conflate antibiotics with analgesics or request them based on previous experiences. In the same national survey, correct knowledge of antibiotics did not vary with educational attainment or between urban and rural residents, so the misconception encountered at the chairside is not confined to any patient group a clinician could readily anticipate [10]. Global evidence suggests that such expectations can influence dentists to prescribe inappropriately in order to maintain the provider-patient relationship or prevent patients from seeking care elsewhere [9, 11]. Addressing this requires population-level public health communication.

Defensive medical practices and risk aversion are additional factors associated with inappropriate prescribing. Participants noted the use of antibiotics as a precautionary measure against postoperative complications and potential legal liability, particularly following procedures such as implant placement. This aligns with existing literature suggesting that clinicians may prescribe antibiotics to manage diagnostic uncertainty or the perceived need to intervene [9]. However, this approach contrasts with evidence-based guidelines. For instance, the ADA guideline generally recommends Definitive Conservative Dental Treatment (DCDT), such as extraction or incision and drainage, rather than systemic antibiotics for most pulpal and periapical dental pain and localized swelling in immunocompetent adults, reserving antibiotics for defined circumstances such as systemic involvement or delayed access to definitive care [7]. Routine multi-day postoperative prophylaxis without a specific evidence-based indication, and prescribing solely to compensate for poor oral hygiene, fall outside those circumstances. The AHA separately restricts infective endocarditis prophylaxis to a narrow group of high-risk cardiac patients [8].

The tendency to rationalize non-compliance by citing local contexts and reliance on previous educational paradigms highlights potential areas for improvement in continuing professional development. The assumption that local populations possess different immunological responses is not supported by evidence and may serve to rationalize deviation from international standards, although the present data cannot establish the underlying motivation. Furthermore, reliance on historical university training or on information from pharmaceutical representatives can sustain established prescribing patterns. Targeted education led by infectious disease specialists has shown positive outcomes; one study reported that specialized antimicrobial stewardship (AMS) education for private practice dentists improved appropriate antibiotic use from 19.0% to 87.9% [12]. The limited availability of point-of-care microbiological testing was described as driving empirical broad-spectrum prescribing, which is of concern given the diversity of resistance genes within the oral microbiome [5]. Non-prescription dispensing

further complicates stewardship and indicates a need for stronger regulatory enforcement [13].

To address these prescribing behaviors, the application of behavioral science models can be beneficial. The COM-B (Capability, Opportunity, Motivation - Behavior) framework has been utilized in dentistry to evaluate and guide interventions. For instance, an initiative utilizing the COM-B model to address clinicians' concerns and knowledge gaps reported a reduction in inappropriate antibiotic prescribing following third molar surgeries from 84.45% to 20.89%, without an observed increase in infection rates [14].

Moreover, active stewardship interventions incorporating social psychology principles have shown promise in modifying prescribing habits. The RAPiD cluster-randomized controlled trial demonstrated that Audit and Feedback (A&F) mechanisms - which provide dentists with individualized data comparing their prescribing rates to their peers - can lead to a reduction in antibiotic prescriptions, particularly when combined with a written behavior-change message [3, 15]. Additionally, behavioral "nudges" may offer cost-effective approaches: in a primary care trial, public commitment posters displayed in examination rooms, where clinicians outline their commitment to responsible antibiotic prescribing, reduced inappropriate prescribing for acute respiratory infections by 19.7 percentage points relative to control [16]. That trial was conducted outside dentistry and its transferability to the dental setting has not been tested, so it is raised here as a candidate rather than as established dental evidence.

Conclusion

Antimicrobial resistance (AMR) is a critical global

health challenge, and the dental profession must play an active role in mitigating this crisis. The findings of this study indicate that inappropriate antibiotic prescribing in dentistry is not explained by a knowledge deficit alone; knowledge-related factors, including uncertainty about prophylactic regimens, operated alongside patient expectations, defensive medical practices, reliance on earlier educational paradigms, and systemic regulatory vulnerabilities. The significant gap between evidence-based guidance and public health literacy further complicates clinical decision-making, often positioning antibiotics as a precautionary measure rather than as a considered and specific clinical choice.

To effectively improve prescribing habits, the dental sector must move beyond the passive dissemination of clinical guidelines. A comprehensive, multifaceted approach appears necessary. This includes the implementation of active Antimicrobial Stewardship (AMS) programs that integrate behavioral science frameworks, such as the COM-B model, alongside practical and low-cost "nudges" such as public commitment posters. It also includes targeted continuous education led by infectious disease experts, systemic Audit and Feedback (A&F) mechanisms, and stricter regulatory enforcement regarding over-the-counter antibiotic sales.

Ultimately, enhancing public health literacy and providing clinicians with the necessary institutional support to prioritize Definitive Conservative Dental Treatment (DCDT) over unnecessary systemic antibiotics is likely to be central to this effort. Each of the measures outlined above requires evaluation in Georgian dental practice before its effect in this setting can be assumed.

Table 1. Themes, sub-themes and illustrative quotations from the focus group discussions.

Primary Theme	Sub-theme / Barrier	Illustrative Quotation
Patient Expectations	Pressure & Compulsion	"Sometimes I have to write a prescription because I know they will go elsewhere and obtain it anyway." (Participant 1)
	Misconceptions	"A portion of patients believe that antibiotics are painkillers—or they take antibiotics for other reasons during periods of severe pain." (Participant 3)
Defensive Medicine	Risk Aversion	"I prefer to play it safe and prescribe, rather than have them call me at night saying their temperature has gone up." (Participant 5)
	Professional Liability	"In our reality, if a complication occurs and you haven't prescribed an antibiotic, you will be blamed." (Participant 6)
Knowledge & Guidelines	Skepticism of Standards	"We do read international guidelines, but the immunity and diet of a Georgian patient are different; there are more infections here." (Participant 10)
	Educational Paradigms	"We were taught this way in university, and I have worked with this scheme for years; it hasn't failed me yet." (Participant 11)
Systemic Issues	Regulatory Vulnerability	"They still give them without a prescription in the pharmacy; my prescription sometimes just has a formal character." (Participant 15)
	Diagnostic Barriers	"You cannot send the patient for a bacteriological analysis; it is expensive and takes time, so we directly prescribe a broad spectrum." (Participant 14)

References

1. Murray CJL, Ikuta KS, Sharara F, Swetschinski L, Robles Aguilar G, Gray A, et al. Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis. *Lancet*. 2022;399(10325):629-655.
2. GBD 2021 Antimicrobial Resistance Collaborators. Global burden of bacterial antimicrobial resistance 1990-2021: a systematic analysis with forecasts to 2050. *Lancet*. 2024;404(10459):1199-1226.
3. Teoh L, Loffler C, Mun M, Agnihotry A, Kaur H, Born K, Thompson W. A systematic review of dental antibiotic stewardship interventions. *Community Dent Oral Epidemiol*. 2025;53(3):245-255.
4. Murphy AM, Patel UC, Wilson GM, Suda KJ. Prevalence of unnecessary antibiotic prescriptions among dental visits, 2019. *Infect Control Hosp Epidemiol*. 2024;45(7):890-899.
5. Sukumar S, Rahmanyar Z, El Jurf HQ, Akil WS, Hussain J, Martin FE, et al. Mapping the oral resistome: a systematic review. *J Med Microbiol*. 2024;73(8):001866.
6. Gross AE, Khouja T, Rowan SA, Suda KJ. Unnecessary antibiotic prescribing in dental practices and associated adverse effects. *Curr Infect Dis Rep*. 2021;23(6):
7. Lockhart PB, Tampi MP, Abt E, Aminoshariae A, Durkin MJ, Fouad AF, et al. Evidence-based clinical practice guideline on antibiotic use for the urgent management of pulpal- and periapical-related dental pain and intraoral swelling: A report from the American Dental Association. *J Am Dent Assoc*. 2019;150(11):906-921.
8. Wilson WR, Gewitz M, Lockhart PB, Bolger AF, DeSimone DC, Kazi DS, et al. Prevention of Viridans Group Streptococcal Infective Endocarditis: A Scientific Statement From the American Heart Association. *Circulation*. 2021;143(20):e963-e978.
9. Martine C, Sutherland S, Born K, Thompson W, Teoh L, Singhal S. Dental antimicrobial stewardship: a qualitative study of perspectives among Canadian dentistry sector leaders and experts in antimicrobial stewardship. *JAC Antimicrob Resist*. 2024;6(3):dlae082.
10. Alkhanishvili Z. The dichotomy of progress: public perceptions of global health trends and antibiotic knowledge in Georgia. *PLOS Glob Public Health*. 2026;6(8):e0005037.
11. Otaigbe II, Elikwu CJ. Drivers of inappropriate antibiotic use in low- and middle-income countries. *JAC Antimicrob Resist*. 2023;5(3):dlad062.
12. Goff DA, Mangino JE, Trolli E, Scheetz R, Goff D. Private Practice Dentists Improve Antibiotic Use After Dental Antibiotic Stewardship Education From Infectious Diseases Experts. *Open Forum Infect Dis*. 2022;9(8):ofac361.
13. Darakhvelidze M, Kalandadze I, Mirzikashvili N, Tsereteli D, Zakareishvili N, Ketchakmadze I. Self-medication with antibiotics in Georgian population. *Front Pharmacol*. 2024;15:1254817.
14. Yong CW, Choe R, Chua SKX, Lum JL, Wang WC. Utilising a COM-B framework to modify antibiotic prescription behaviours following third molar surgeries. *Ann Acad Med Singap*. 2025;54(6):340-349.
15. Xu AXT, Brown K, Schwartz KL, Aghlmandi S, Alderson S, Brehaut JC, et al. Audit and Feedback Interventions for Antibiotic Prescribing in Primary Care: A Systematic Review and Meta-analysis. *Clin Infect Dis*. 2025;80(2):253-262.
16. Meeker D, Knight TK, Friedberg MW, Linder JA, Goldstein NJ, Fox CR, et al. Nudging guideline-concordant antibiotic prescribing: a randomized clinical trial. *JAMA Intern Med*. 2014;174(3):425-431.