Annals of Medicine and Medical Sciences (AMMS)
Volume 04, 2025, *Page No.: 1283 to 1290*
Available at: *http://ammspub.com*

Review Article

OPEN ACCESS

Pharmacovigilance in Dental Practice: Opportunities for Pharmacy-Dentistry Collaboration

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Abstract

Pharmacovigilance is considered to be an essential part in ensuring drug safety across healthcare disciplines, despite that, its integration into dental practice is limited and overlooked. Dentists prescribe antibiotics, analgesics, and local anesthetics on a daily basis, all of which can result in adverse drug reactions (ADRs). However, reporting of ADRs by dental professionals is significantly lower than in other medical fields, which causes gaps in public health surveillance and patient safety. This narrative review highlights the poorly developed state of pharmacovigilance in the realm of dentistry, identifying key barriers such as a lack of awareness, limited educational training, and systemic issues responsible for the under-reporting of adverse drug reactions (ADRs). The review points out the growing critical role of pharmacists for boosting drug safety through patient counseling, prescription monitoring, and facilitating ADR reporting mechanisms. The review calls for multi-professional teamwork, especially for those from the low- and middle-income countries, and proposes the infusion of online tools, target educational programs, and policy changes for the integration of pharmacovigilance into routine dental practice and public health outcomes.

Keywords: ***Pharmacovigilance, Adverse drug reactions, Pharmacist-dentist collaboration, Digital reporting tool, Patient education.***

1. Introduction

Pharmacovigilance is defined as the science and activities relating to the assessment, detection, and prevention of adverse effects of medications, it is an essential step in ensuring patient safety [1,2]. Even though it is well established in medicine and pharmacy, pharmacovigilance application in dentistry is still underdeveloped and underreported globally [3]. Dentists prescribe a wide range of drugs including antibiotics, painkillers, anti-inflammatory, and local anesthetics, all of these drugs have the potential of adverse drug reactions (ADRs) or interactions with other medications [4]. Despite this, reporting of ADR is thought to be minimal by dental professionals compared to other healthcare fields [5].

Pharmacists, who are the medication experts in the healthcare field and the gatekeepers of safe drug use, are collaborating with dental professionals to improve pharmacovigilance in oral healthcare settings. Their role can expand beyond dispensing to include patient counselling on drug-drug interaction and ADR detection in addition to patient education on the proper use of medication in dental care [6]. In low- and middle-income countries (LMICs) where healthcare regulations are not as strong, pharmacist-dentist collaboration can offer a promising strategy to enhance rational medication use and reduce harmful events [7,8].

Despite the frequency of medication use in dental practice, underreporting of ADRs by dental professionals remains a global issue. A study conducted in Europe revealed that less than 1% of ADR reports originated from dentists, reflecting both limited awareness and insufficient integration of pharmacovigilance training in dental education [9]. In LMICs, this problem is magnified by weak regulatory infrastructures and limited cross-disciplinary collaboration [10]. Such underreporting not only compromises individual patient safety but also undermines public health surveillance systems designed to detect emerging drug safety signals[8].

Pharmacists, with their expertise in medication safety and pharmacovigilance systems, are well positioned to fill this gap in dental practice. Their role in screening prescriptions, counseling patients, and documenting ADRs provides a valuable extension to dental care teams [11]. Collaborative models have demonstrated success in medical settings, such as antimicrobial stewardship programs and vaccination initiatives, suggesting similar benefits could be achieved in dentistry [12]. Moreover, the emergence of digital health tools, including electronic ADR reporting platforms and mobile applications, offers opportunities for the integration of pharmacovigilance into routine dental workflows [13]. The growing awareness of antimicrobial resistance (AMR) and medication-induced oral health complications underscores the importance of

Received: September 25, 2025; **Revised:** October 26, 2025; **Accepted:** October 28, 2025

addressing pharmacovigilance in dental settings [14]. Strengthening the collaboration between pharmacy and dentistry within a public health framework could enhance rational prescribing, reduce ADRs, and ultimately improve patient outcomes.

This review explores the challenges and opportunities of pharmacovigilance in dental practice, focusing on the critical role pharmacists play in optimizing safety in prescribing and reporting practices.

2. Pharmacovigilance in Dentistry

Pharmacovigilance is an essential pillar of healthcare systems, despite that, its application in dentistry is limited in both practice and awareness. Dentistry lacks standardized protocols for ADR reporting, despite the frequent use of prescription medications [15]. Numerous studies have reported low levels of training related to pharmacovigilance among dental practitioners, with many practitioners being unaware of institutional ADR reporting systems[16]. In addition, a systemic review found that most dental professionals consider pharmacovigilance as the responsibility of pharmacists or physicians, rather than their own [17].

In many countries, especially LMICs, pharmacovigilance systems are still developing. This limits the practice of reporting and tracking of drug-related adverse effects arising in dental practice. In a survey of dental professionals conducted in India, it was found that only 11% reported any familiarity with the national ADR reporting form [18]. As a result, dental-related ADRs may not be documented, which results in an underestimation of risks and missed opportunities for public health interventions.

Dentistry represents a critical but an overlooked field in pharmacovigilance. Even though dental practice primarily focuses on local interventions, the prescription of systemic medications including antibiotics, analgesics, antifungals, and sedatives exposes patients to risks of adverse drug reactions ADRs and drug interactions [19]. Common ADRs encountered in dentistry include hypersensitivity to local anesthetics, antibiotic-associated gastrointestinal disturbances, and bleeding complications linked to NSAIDs in patients on anticoagulant therapy [20].

Despite these risks, the contribution of dentists to national and international pharmacovigilance systems remains disproportionately low. Studies in Europe, Asia, and Africa consistently report that dentists rarely submit ADR reports, largely due to lack of awareness, limited training, and the perception that ADR reporting is outside their professional responsibility [21,22]. Even when ADRs are recognized, underreporting is common, as dentists prioritize immediate clinical management rather than systematic documentation [23].

Another important dimension is the overlap between dentistry and systemic disease management. For example, patients with cardiovascular diseases, diabetes, or immunocompromised states are more susceptible to medication-related oral complications, such as gingival hyperplasia from calcium channel blockers or xerostomia from antihypertensive drugs [24]. These conditions require dental professionals not only to recognize ADRs but also to communicate effectively with physicians and pharmacists to ensure safe treatment planning.

Globally, dental practice provides limited exposure to pharmacovigilance principles. A survey across dental schools revealed insufficient emphasis on ADR reporting, leading to knowledge gaps that persist into professional practice [25]. Educational interventions, workshops, and integration of digital ADR reporting platforms into dental clinics have shown promise in improving participation [24]. The expansion of interprofessional collaboration, particularly with pharmacists, offers a chance to strengthen pharmacovigilance in dentistry and align it with broader public health objectives [25]. Focusing on interprofessional collaboration, particularly between dentists and pharmacists could provide a sustainable approach for strengthening pharmacovigilance within dentistry. Such collaborative approaches not only enhance patient safety in dental settings but also align pharmacovigilance efforts with wider public health objectives.

3. Medications-Related Risks in Dental Practice

Dentists prescribe medications in a routine base such as painkillers, antibiotics, non-steroidal anti-inflammatory drugs (NSAIDS), and anesthetics. these medications can be risky if used inappropriately or without proper counselling. Common ADRs include hypersensitivity reactions to drugs especially penicillins and anesthetics, gastrointestinal disturbances due to the use of NSAIDs in addition to systemic toxicity in limited population [26].

One of the common concerns in dental practice is the Drug-drug interactions, especially in elderly patients or polypharmacy patients. For example, the co-prescription of NSAIDs with anticoagulants can increase the risk of bleeding, which is critical during dental extraction procedure or dental surgery in general [27]. Local anesthetics, particularly those containing epinephrine, can have risks in hypertensive patients or those using beta-blockers [28]. Pharmacists are well-equipped and educated to spot such risks and intervene proactively.

Medications used in dental settings carry diverse risks that can compromise patient safety if not adequately monitored. For instance, NSAIDs, widely prescribed for dental pain, may precipitate gastrointestinal bleeding, or interfere with anticoagulant therapy [29]. Similarly, the prophylactic use of antibiotics, though often routine, increases the likelihood of antibiotic resistance and exposes patients to allergic reactions ranging from mild rashes to life-threatening anaphylaxis [30].

Other medication-related risks in dental practice include drug-induced oral complications. Calcium channel blockers and phenytoin are well known to cause gingival overgrowth, while bisphosphonates and denosumab are associated with medication-related osteonecrosis of the jaw (MRONJ), a condition of significant clinical concern [31]. Furthermore, sedatives such as benzodiazepines, when administered for dental anxiety, pose risks of respiratory depression, particularly in medically compromised patients [32].

Given these risks, it is essential that dental professionals work closely with pharmacists to evaluate drug histories, recognize potential interactions, and monitor for adverse drug reactions. Interprofessional collaboration in this context strengthens pharmacovigilance and enhances patient safety [33]. These findings highlight the urgent need to integrate pharmacovigilance into routine dental practice. Educational reform, digital tools, and interprofessional collaboration provide a multifaceted approach to minimizing medication-related harms while promoting safer and more effective dental care.

4. Causes of Underreporting in Dental Pharmacovigilance

Underreporting of ADRs is a major barrier to effective pharmacovigilance in dental practice. Lack of knowledge about reporting systems in addition to time constraints and uncertainty in regard to whether these events are considered an ADR or not are main reasons [34]. A study that was conducted in the UK concluded

that less than 2% of total ADR reports came from dental professionals over a ten-year period [35].

The significance of underreporting is serious: it hinders early detection of drug safety signals, prolong knowledge gaps regarding drug risks in dental practice and delay action toward ADR. Public health systems rely on real-world pharmacovigilance data to refine the policies of drug usage and update safety warnings [36]. Increasing reporting from dental professionals would strengthen the safety databases and support better decisions.

A primary reason is the lack of awareness and training among dental professionals, many of whom receive little formal education on pharmacovigilance during undergraduate or postgraduate studies [37]. Dentists often prioritize immediate patient management over systematic reporting, reflecting a perception that ADR documentation is time-consuming and secondary to clinical care [38].

Attitudinal barriers also play a role, with some dental practitioners believing that a single ADR report will not significantly influence drug safety monitoring, or that only severe cases are worth reporting [39]. In addition, uncertainty about causality–whether a particular drug caused the adverse effect–can discourage reporting, especially in cases where patients are taking multiple medications[40].

Systemic issues, such as lack of integration of reporting systems into dental practice software, insufficient feedback from regulatory bodies, and fear of potential legal consequences, further undermine dentist participation in pharmacovigilance [41]. These barriers highlight the urgent need for targeted educational interventions, simplified reporting mechanisms, and stronger interprofessional collaboration to improve ADR reporting in dental settings.

5. Pharmacists' Roles in Dental Pharmacovigilance

Pharmacists play a significant role in advancing pharmacovigilance in dental care practice. Pharmacists can educate dental patients about possible ADRs, detect, and monitor high-risk prescriptions and report suspected reactions via national systems [42]. Community pharmacists are well-positioned to spot and identify repeated dispensing patterns that may suggest inappropriate dental prescribing or misuse. Furthermore, pharmacists are key collaborators in managing polypharmacy in dental patients, specifically in patients with chronic diseases such as diabetes, hypertension, or cancer. They also help dentists by reviewing patient medication history and identifying drug-drug interactions or contraindications [43]. Collaboration between dentists and pharmacists in practice can help in detecting such interactions, leading to better patient outcomes and a stronger pharmacovigilance system.

Pharmacists, as accessible and trusted healthcare providers, are fit to fill the gap. Their experience and knowledge in medication safety, drug interactions, and adverse drug reactions detection makes them the best companion to dental professionals. Evidence supports that the more active roles the pharmacists take in dentistry the lower the risks of ADRs.

6. Collaboration Between Dentists and Pharmacists in Reporting ADRs

Collaboration between dentists and pharmacists is a cornerstone of public health. In countries like the UK, Australia, and Canada, pharmacists and dentists are engaging in shared care protocols for managing medication-related oral health risks [44]. For example, pharmacists participate in dental screening programs and help in monitoring ADRs of medications like bisphosphonates, which may result in osteonecrosis of the jaw [45].

Public health models such as WHO's concept of "integrated primary care" encourage interdisciplinary teamwork, especially in rural areas. Shared electronic health records also assist pharmacovigilance by enabling pharmacists and dentists to have access and record patient drug history and ADRs efficiently [46]. These models help in reducing harm and enhance the rational use of medication and improve patient satisfaction. Joint educational workshops and interdisciplinary training sessions have been shown to improve ADR reporting rates, as both professions gain awareness of the other's role and responsibilities [47].

In hospital and academic settings, integrated pharmacovigilance programs where pharmacists and dentists share electronic health records and reporting platforms have demonstrated better detection and reporting of ADRs compared to siloed practice models [48]. Community settings also benefit from collaboration, particularly when pharmacists provide medication histories that help dentists identify possible drug-induced complications.

Ultimately, having strong communication channels and mutual respect between dentists and pharmacists enhances ADR reporting, supports safer prescribing practices, and advances the public health mission of pharmacovigilance [49]. Overall, strengthening communication and cultivating mutual respect between dental and pharmacy professionals are essential to advancing pharmacovigilance. Such collaboration not only improves ADR reporting and supports safer prescribing but also reinforces the broader public health objective of safeguarding patients through rational and responsible use of medicines.

7. Pharmacovigilance Policy Recommendations

To develop the concept of pharmacovigilance in dentistry, number of strategic changes are required. First, educational curriculum for dental students should include pharmacovigilance as a main topic, with a focus on ADR documentation, identification, and reporting [50]. Continuing professional development (CPD) programs can also strengthen this among dentists in practice.

From a policy point of view, regulatory agencies should encourage ADR reporting from all healthcare professionals, including dentists, and simplify reporting process. The integration of pharmacists into dental public health teams can be backed up through formal policies and funding mechanisms [51]. Globally, the WHO and the International Pharmaceutical Federation (FIP) in addition to other institutions can offer frameworks for countries to adapt and implement pharmacist-dentist collaborations in pharmacovigilance [52].

Effective pharmacovigilance in dental practice requires not only professional awareness and interprofessional collaboration but also robust policy frameworks that integrate dentistry into national and global drug safety systems. Currently, most pharmacovigilance guidelines focus on physicians, pharmacists, and hospitals, while dentistry remains underrepresented [53]. Including dental professionals explicitly in pharmacovigilance legislation and reporting could improve the breadth and quality of adverse drug reaction (ADR) surveillance.

Policymakers should also prioritize integration of ADR reporting into dental electronic health records and practice management software. Streamlined digital tools that allow dentists to report ADRs quickly and share data with pharmacists and national

regulatory authorities would reduce barriers to reporting [54]. Additionally, mandatory continuing education on pharmacovigilance for both dentists and pharmacists could strengthen professional accountability and encourage consistent participation [55].

From a public health perspective, guidelines should emphasize antibiotic stewardship in dentistry, given its significant contribution to inappropriate antimicrobial prescribing worldwide. National and regional dental councils, supported by ministries of health, should collaborate with pharmacy regulatory bodies to ensure rational prescribing policies are implemented and audited [56].

Antibiotic stewardship remains a critical priority in dentistry, given the profession's considerable contribution to inappropriate antimicrobial prescribing worldwide. To address this, national and regional dental councils should collaborate with ministries of health and pharmacy regulatory bodies to establish and audit rational prescribing frameworks. Such coordinated strategies would not only improve patient safety but also mitigate the global threat of antimicrobial resistance.

8. Pharmacovigilance of Dental Antibiotic Use and Antimicrobial Resistance (AMR)

Dentists are considered to be one of the top prescribers of antibiotics in outpatient settings, often prescribing them for cases where their use may not be clinically indicated, such as irreversible pulpitis or periapical abscesses without systemic symptoms [57]. This practice contributes significantly to the global issue of antimicrobial resistance (AMR), which is a major public health delimma. Several studies from both high- and low-income countries found that inappropriate dental antibiotic prescribing stems from patient pressure, diagnostic uncertainty, and lack of local antimicrobial stewardship guidelines [58].

This overprescribing pattern contributes substantially to the escalating problem of antimicrobial resistance (AMR), a pressing global public health challenge. Research across both high- and low-income countries highlights common drivers of inappropriate prescribing, including patient expectations, diagnostic uncertainty, and the absence of robust, locally adapted antimicrobial stewardship guidelines

Pharmacists play a pivotal role in curbing this trend by reviewing and revising dental antibiotic prescriptions, educating both patients and dentists about rational use of antibiotics and reporting ADRs related to antibiotic misuse. Collaborative antibiotic stewardship programs that include pharmacists have shown effectiveness in reducing inappropriate prescriptions in primary care, and similar models are being explored in dental settings [59].

9. Digital Pharmacovigilance Tools in Dental Settings

The digitization of health records and reporting systems has transformed pharmacovigilance in medical practice, but it is still not used widely in dentistry. Platforms for electronic ADR reporting such as WHO's vigiFlow and UK's Yellow Card system are not used frequently by dentists due to the lack of awareness and training [60]. Implementing these systems into dental practice management software could enhance reporting and increase participation among dentists. Pharmacists have a major role in bridging between digital pharmacovigilance platforms and dentists by providing training seminars or helping with ADR reporting and documentation. Available tools like mobile-based reporting apps and AI-based signal detection systems could enhance this collaboration if utilized across disciplines [61].

10. Patient Education

Patients are usually unaware that common medications may cause oral side effects such as change in taste, dry mouth, and mucosal lesions. Dentists often do not provide counselling for patients on these adverse effects, especially when medications are prescribed by other healthcare professionals [62]. Pharmacists educate patients through Over-The-Counter (OTC) consultations and prescribing counselling about the possible oral adverse effects from medications.

Pharmacovigilance practices in dentistry vary widely across countries, reflecting broader disparities in health system capacity, infrastructure, and policy implementation. In high-income countries (HICs), dentists often have access to electronic health records, structured reporting systems, and continuing education opportunities that facilitate adverse drug reaction (ADR) monitoring [63,64]. By contrast, in LMICs, pharmacovigilance systems remain underdeveloped, with limited reporting by dental professionals due to inadequate training, lack of awareness, and competing clinical priorities [65].

These inequalities pose significant public health challenges, particularly since LMICs bear a higher burden of communicable diseases and are more vulnerable to AMR stemming from inappropriate antibiotic use in dentistry [66]. Moreover, dentistry is often excluded from national pharmacovigilance frameworks, which tend to prioritize hospitals, physicians, and pharmacists, leaving gaps in ADR reporting and antibiotic stewardship [67].

Integrating these electronic reporting tools directly into dental practice management software could streamline the process, reduce reporting barriers, and encourage greater participation among dental professionals. Such integration would not only improve ADR detection within dentistry but also strengthen contributions to national and global pharmacovigilance databases.

Coordination between pharmacists and dentists can ensure that patients receive proper counseling which includes preventive approaches like using saliva substitutes, hydration, and early dental evaluation for continuous symptoms. Public health education campaigns can significantly be strengthened by including oral side effects in medication safety programs [68].

11. Global Inequalities in Dental Pharmacovigilance Practices

There are differences in pharmacovigilance integration across countries. HICs have a well-established ADR reporting systems and continuing education programs for healthcare professionals including dentists. However, many LMICs does not have a pharmacovigilance framework [69]. Non-governmental organizations such as the WHO and FIP have been focusing on the importance of building pharmacovigilance capacity in LMICs through training, policy support and sharing data platforms. These efforts should include dental-specific guidance and the involvement of pharmacists to support surveillance and safe prescribing practices in underserved regions [70].

11. Conclusion and perspectives

Pharmacovigilance in dental practice remains an underdeveloped area, despite the widespread and increasing use of medications in oral healthcare. The lack of ADR reporting by dentists represents a

missed opportunity for enhancing patient safety and public health surveillance. This review underscores the critical role that pharmacists can play in strengthening pharmacovigilance systems within dentistry through collaborative practices, patient education, medication monitoring, and ADR reporting.

To realize the full potential of this partnership, structural changes are needed at both educational and policy levels. Integrating pharmacovigilance into dental training, promoting interprofessional communication, and enabling pharmacists to contribute to dental pharmacovigilance workflows are essential steps. Ultimately, creating a collaborative framework between pharmacy and dentistry can contribute meaningfully to safer, more accountable, and more effective oral healthcare delivery.

Declarations

Ethical Clearance

Not applicable

Conflict of interest

The authors declare that there is no conflict of interest

Funding/ financial support

This study received no specific grant from any funding agency in the public, commercial or not for profit sector

Contributors

MSM, LSHA, and WASB: Conceived the idea for the review, and designed the structure. MSM, LSHA, WASB, KMK, and DHB: Performed the literature search, data collection, and initial drafting of the manuscript. MSM, and BAY: Contributed to data analysis, interpretation, and critical revision of the content. BAY: Supervised the study. All authors contributed to writing, provided intellectual input, revised the manuscript critically for important content, and approved the final version for publication.

Acknowledgements

None

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