

Stacked Scripts, Stacked Risks: A Critical Look at Polypharmacy in a Dental School Setting

Marquez IC^{1*}, Castillo-Astorga Y², Chaudhary S², Fernandez L², Khan BT²

¹Associate Professor, AT Still University School of Dentistry and Oral Health, Saint Louis, MO. 63104, USA.

²Fourth year student, AT Still University School of Dentistry and Oral Health, Saint Louis, MO. 63104, USA.

***Corresponding Author:** Ignacio Christian Marquez, DDS, MS, Associate Professor, AT Still University School of Dentistry and Oral Health, Saint Louis, MO 63104, USA.

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Abstract

Objectives: Polypharmacy is defined as the concurrent use of five or more medications, a common finding in the adult and elderly populations. The aim of this project was to retrospectively determine the prevalence of polypharmacy among four hundred adult and elderly patients of record in a dental school.

Methods: Subject's privacy was obtained through strict anonymization protocols and secure data handling. More specifically, our project sought to identify those medical conditions, medical patterns, and demographic factors most associated with polypharmacy. Descriptive statistics, ANOVA, and logistic regression methods were employed for data analysis.

Results: Overall the prevalence of polypharmacy was 44.3% (n=177); when it comes to age and gender, polypharmacy was present in 25.8% (n=56) of patients younger than age 50 versus 66.1% (n=121) in patients older than age 50, $p < 0.001$; in terms of gender, polypharmacy was present in 43.4% (n=96) of women versus 45.3% (n=81) among men, $p = 0.72$. The three most common systemic conditions present among our study population were cardiovascular diseases, endocrine and metabolic conditions, and psychiatric disorders, which presented 40.5%, 30.5%, and 21.3% respectively. Medication pattern analysis showed that atorvastatin (24%), acetylsalicylic acid (21%), amlodipine (19%), lisinopril (18%), and metformin (18%) were by far the most frequently taken drugs.

Conclusion: The findings of this research project proved that polypharmacy is quite prevalent among dental school patients and should bring insight for dental professionals by contributing to a better understanding of it in dental settings, thus supporting improved patient management and treatment planning.

Keywords: Polypharmacy, Prevalence, Adults, Dental School Clinic.

Introduction

Polypharmacy is defined as the use of multiple medications (>5) and is common in the elderly adult population. Polypharmacy typically results from the accumulation of treatments for chronic medical conditions such as hypertension, diabetes, coronary artery disease, and psychiatric illnesses. It is associated with problems such as increased risk of falls and adverse medication events. Elderly patients take an average of two to nine medicines per day, and prevalence of polypharmacy in the elderly is 11.5%–62.5%. Elderly patients are at higher risk of adverse drug reactions due to metabolic changes and reduced drug clearance. Evaluation of polypharmacy is an important part of clinical assessment of the elderly population.

This process involves performing adequate medication reconciliation, including supplements, followed by systematic evaluation of medications looking for benefits and harms. It then involves discussing goals of care with the patient and, if necessary, creating a deprescribing plan. When prescribing new medications, prescribers should consider starting at the lower end of the dosing range and increasing only after monitoring benefits and harms [2].

The reviewed literature reveals a growing concern about the multifaceted impacts of polypharmacy, highlighting its particular implications for oral health [1,6]. Studies indicate that polypharmacy is linked to several adverse oral health outcomes, with dry mouth (hyposalivation/xerostomia) being one of the most commonly reported issues [3,5,10]. Hyposalivation can lead to a range of dental problems, including increased caries, tooth loss, and diminished chewing ability. These dental issues can subsequently affect nutritional intake, leading to malnutrition and further health complications, thus creating a vicious cycle of deteriorating health [4].

Despite the recognition of these issues, gaps persist in healthcare providers' understanding of polypharmacy's effects, particularly in dental settings [18]. There is a notable lack of comprehensive education on drug interactions and concurrent prescribing practices among dental professionals. Given that dentists may not prescribe a wide range of medications, understanding the medications that patients are taking is crucial for managing oral health effectively and preventing adverse events.

The literature highlights the need for improved education and strategies to manage polypharmacy effectively [18]. Effective medication management, including deprescribing and personalized treatment plans, is essential to mitigate the risks associated with polypharmacy. However, much of the existing research focuses primarily on elderly populations, with limited studies addressing younger age groups and the specific challenges faced in dental settings in the USA. To address these gaps, there is a need for further research that includes diverse demographics and explores the complexities of polypharmacy across different patient populations.

Based on the theoretical framework of patient-centered care, the primary objective of this research was to identify and analyze demographic variations in the prevalence of polypharmacy among dental clinic patients, focusing on differences across age and gender. A secondary objective was to identify the most common medical conditions and prescriptions presented by patients on polypharmacy at Saint Louis Dental Center - AT Still University Missouri School of Dentistry and Oral Health and understand the intersection of these conditions and medications with dental care needs.

Methods

This study employed a retrospective descriptive design. The study population comprised patients attending AT Still University Missouri School of Dentistry and Oral Health. A total of 400 patient records were included. All patients aged 18 years and older were eligible for inclusion, while those under 18 were excluded to focus on adults, who are more likely to present with complex medication regimens associated with polypharmacy. This age restriction also helped prevent potential bias from pediatric polypharmacy cases.

Prior to data collection, approval was obtained from the Institutional Review Board (IRB) of the university to ensure ethical conduct and protection of patient rights and confidentiality. Data were collected through a comprehensive manual review of existing medication records documented in patient charts at the dental school clinic. These records included medications currently prescribed or reported as used by patients within the previous 12–24 months. Only patients with medication lists verified by their primary care provider or a pharmacy were included in the analysis.

The prevalence of polypharmacy was determined using frequency counts and proportions. Descriptive statistics, including means, medians, and standard deviations, were used to analyze variations in medication use across demographic factors such as age and gender. Statistical analyses were conducted using IBM SPSS software. Chi-square tests, ANOVA, and logistic regression models were applied to assess differences in medication patterns across age and gender groups, and to evaluate associations between comorbidities and polypharmacy. The analysis also identified the most frequently prescribed medications and their associated medical conditions.

Ethical Considerations

To ensure compliance with IRB protocols, a single team member was responsible for data extraction. Patient information was anonymized following data collection to maintain confidentiality. All procedures adhered to institutional guidelines and legal standards for the use and protection of patient data.

Results

The prevalence of polypharmacy among the study sample was 44.3%. While no significant difference was observed based on gender, age demonstrated a clear association with polypharmacy. Among patients under 50 years of age, 25.8% were identified as being on polypharmacy, compared to 66.1% of those over 50 (Table 1).

Figure 1 illustrates this age-related distribution. The top histogram shows that patients without polypharmacy were predominantly younger, with a peak in the 20–40 age range. In contrast, the bottom histogram indicates that polypharmacy was more prevalent among older patients, particularly those aged 65–75 years.

Figure 2 presents the distribution of polypharmacy by medical conditions. Cardiovascular diseases accounted for the largest share (40.5%), followed by endocrine disorders (30.5%) and mental health disorders (21.3%).

Regarding the most frequently prescribed medications (Table 2), the data show that Atorvastatin was the most common (18.5%), followed by Acetylsalicylic acid (16.3%), Amlodipine (14.5%), Lisinopril (13.8%), and Metformin (13.5%).

An analysis by the number of comorbidities (Table 3) revealed a strong correlation with polypharmacy. Among patients with fewer than three comorbidities, the prevalence of polypharmacy was 13.7%, while it increased substantially to 83.9% in patients with three or more comorbidities.

According to Table 4, conditions with a p-value <0.001 were significantly associated with polypharmacy, suggesting a strong relationship between specific diagnoses and increased medication use.

Logistic regression analysis further demonstrated that for each additional comorbidity, the number of medications prescribed increased by a factor of 1.5. This relationship is visually represented in the scatter plot shown in Figure 3.

		Polypharmacy		P Value
		No	Yes	
Overall		223 (55.8%)	177 (44.3%)	0.72
Gender	Female	125 (56.6%)	96 (43.4%)	
	Male	98 (54.7%)	81 (45.3%)	
Age	< 50 years old	161 (74.2%)	56 (25.8%)	<0.001*
	≥ 50 years old	62 (33.9%)	121 (66.1%)	
Age, Mean ± SD		41.1 ± 16.8	58.9 ± 17.6	<0.001*

Table 1. Prevalence of polypharmacy across gender and age.

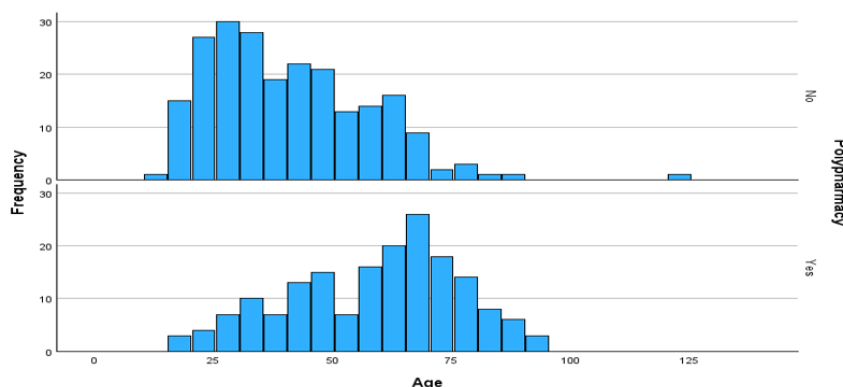


Figure 1. Frequency of polypharmacy across age groups.

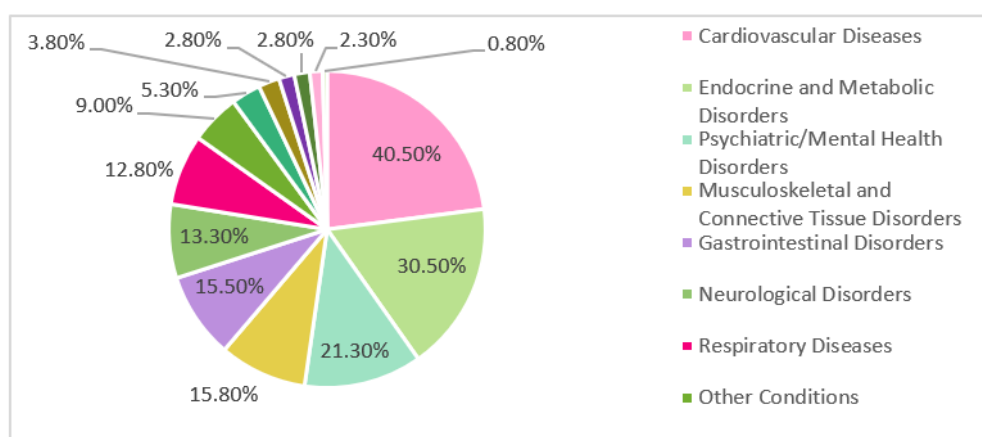


Figure 2. Distribution of polypharmacy across medical conditions.

Table 2. Top 5 Most commonly used medications and associated conditions.

	Frequency	Percentage	Associated Conditions
Atorvastatin	74	18.5%	Cardiovascular Diseases
Acetylsalicyclic acid	65	16.3%	Cardiovascular Diseases
Amlodipine	58	14.5%	Cardiovascular Diseases
Lisinopril	55	13.8%	Cardiovascular Diseases
Metformin	54	13.5%	Endocrine and Metabolic Disorders

Table 3. How does the number of comorbidities influence the likelihood of polypharmacy?

		Polypharmacy		
		No	Yes	
Number of comorbidities	< 3	195 (86.3%)	31 (13.7%)	<0.001*
	≥ 3	28 (16.1%)	146 (83.9%)	
Mean ± SD		0.8 ± 1.3	3.9 ± 2.0	<0.001*

Table 4. Logistic regression – Can we predict whether a patient with a certain condition is likely to be on polypharmacy? *statistically significant values

	Adjusted Odds Ratio	95 % Confidence Interval		P Value
		Lower	Upper	
Cardiovascular Diseases	9.609	5.026	18.369	<0.001*
Endocrine and Metabolic Disorders	3.517	1.816	6.812	<0.001*
Psychiatric/Mental Health Disorders	3.172	1.471	6.840	0.003*
Musculoskeletal and Connective Tissue Disorders	2.822	1.274	6.253	0.01*
Gastrointestinal Disorders	4.074	1.763	9.417	0.001*
Neurological Disorders	5.117	1.986	13.178	<0.001*
Respiratory Diseases	2.771	1.153	6.659	0.02*
Other Conditions	7.557	2.374	24.053	<0.001*
Cancers and Tumors	43.937	4.238	455.482	0.002*
Hematologic and Immune Disorders	0.540	0.096	3.027	0.483
Genitourinary and Renal Disorders	2.364	0.370	15.124	0.364

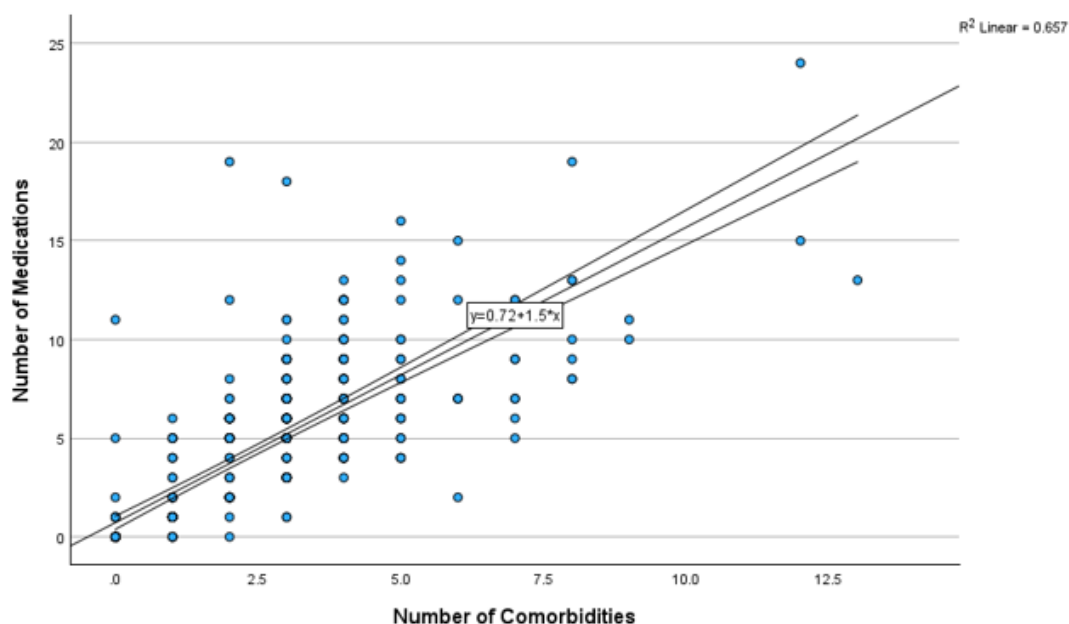


Figure 3. How do multiple conditions impact the number of medications prescribed?

Discussion

This study found a polypharmacy prevalence of 44.3% among adult patients attending a dental school clinic, aligning with growing concerns about the implications of polypharmacy in both primary and dental care settings. Previous literature has reported polypharmacy rates ranging from 30% to over 50% in elderly populations, depending on the definitions and clinical contexts used [9, 14]. Our findings reaffirm the importance of dental providers being equipped to manage patients with complex medication profiles.

Age emerged as a strong predictor of polypharmacy. Patients over the age of 50 were significantly more likely to be on five or more medications compared to younger adults. This trend reflects national data, which show a sharp rise in polypharmacy with advancing age due to increased chronic disease burden and associated pharmacologic interventions [15]. Histograms in Figure 1 visually support this pattern, with polypharmacy clustering among patients aged 65–75 years.

Wang et al. demonstrated an increase in polypharmacy from 8.2% in 1999–2000 to 17.1% in 2017–2018 among U.S. adults, with even steeper increases among the elderly and individuals with heart disease or diabetes [21]. Our study's prevalence of 66.1% among patients over 50 is consistent with these national trends.

In terms of associated conditions, cardiovascular diseases, endocrine disorders, and mental health conditions were the most common comorbidities linked to polypharmacy in our population. This is consistent with previous studies identifying these categories as primary contributors to medication burden [11]. The most commonly prescribed medications in our sample—atorvastatin, acetylsalicylic acid, amlodipine, lisinopril, and metformin—also mirror patterns observed in older, medically complex populations [7,12].

A particularly striking result was the association between comorbidity burden and polypharmacy: patients with three or more comorbidities had an 83.9% prevalence of polypharmacy, compared to just 13.7% among those with fewer conditions. Logistic regression confirmed that each additional comorbidity increased the likelihood of polypharmacy by a factor of 1.5. This finding echoes research showing a compounding relationship between multimorbidity and increased pharmacologic complexity [13].

Interestingly, gender was not a significant factor in our sample, contrasting with studies that have reported higher rates of polypharmacy in women, often attributed to more frequent healthcare visits and prescriptions of psychotropic medications [20]. This discrepancy may reflect regional prescribing habits or the unique demographics of our clinic population.

From a clinical perspective, polypharmacy poses challenges for dental management. Drug–drug interactions, xerostomia, bleeding risks, altered healing, and osteonecrosis are among the complications dentists must anticipate [17, 8]. Saliva, often considered the “holy grail” of geriatric dentistry, is significantly affected by many common medications, and its reduction can lead to tooth loss, pain, candidiasis, and nutritional deficiencies ([19]. One study in a Swiss nursing home found a direct correlation between polypharmacy, tooth loss, and malnutrition [16].

These findings emphasize the need for preventive strategies such as salivary flow testing, medication reconciliation, and patient education about the oral side effects of medications. Interdisciplinary communication with primary care providers is also crucial to address the possibility of deprescribing when appropriate.

A major strength of this study is its manual verification of medication lists, which minimizes inaccuracies often found in self-reported data. The study also includes a relatively large and diverse patient sample, enhancing its clinical relevance to academic dental settings. To our knowledge, this is the first known U.S.-based study to examine the prevalence and predictors of polypharmacy specifically within a dental school clinic population, filling an important gap in the literature and laying the groundwork for further research at the intersection of dentistry and systemic medication management.

However, this research has several limitations. First, it is cross-sectional and retrospective in design, limiting the ability to infer causality or assess temporal changes. Second, the study relies solely on chart data, which may not capture all medications, particularly over-the-counter drugs, supplements, or non-disclosed prescriptions. Third, while comorbidities were reviewed, their severity, chronicity, and impact on oral health outcomes were not assessed. Finally, generalizability may be limited, as findings may not fully reflect patterns in private practices, community clinics, or geographically different populations.

Recommendations

Based on the findings of this study, we propose the following strategies to enhance the management of dental patients affected by polypharmacy:

- **Chairside Saliva Testing:** Incorporate salivary flow and pH testing for patients on multiple medications to identify xerostomia risk. Prescribe sialagogues or suggest saliva substitutes when appropriate.
- **Patient Education:** Educate patients on medication-related oral side effects, especially dry mouth, and provide guidance on symptom management and prevention strategies.
- **Collaborative Deprescribing:** Though outside direct dental scope, dentists can flag medication-related oral issues and collaborate with physicians to evaluate deprescribing options when safe.
- **Use of Clinical Databases:** Consult evidence-based resources (e.g., UpToDate, Lexicomp) to stay informed on drug interactions and oral health risks, supporting safer, more informed care.

Future Implications

Future studies should incorporate salivary testing (e.g., flow rate, pH) to objectively assess xerostomia risk in patients on polypharmacy and correlate these findings with their medication profiles. Additionally, future research should examine the longitudinal impact of polypharmacy on oral health outcomes, including caries risk, periodontal disease progression, and healing capacity.

Conclusion

Polypharmacy is critically prevalent among dental patients, highlighting the need for greater awareness and interdisciplinary strategies. Proper addressing of polypharmacy will significantly improve patient quality of life, outcomes of dental treatment, and enhance interprofessional collaboration to support deprescribing practices and medicine optimization.

Conflict of Interest Statement

The authors disclosed no financial, economic, or professional interests that may have influenced the design, execution, or presentation of the scholarly work.

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