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Discrepancy in medications reported by elderly patients in the dental office and in their electronic medical records: A pilot study

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Abstract

Aims: This study's main objective was to analyze the discrepancy between the dental medication record (DMR) and the physician-prescribed active medications recorded in the medical medication record (MMR).

Methods: The study group consisted of 100 adults who attended the University Dental Clinic (Santiago de Compostela, Spain) requesting dental care. A dental history was created for all participants that included the DMR. The MMR were compiled from their electronic medical records.

Results: About 80% of the patients consumed at least one drug (94.2% of those >65 years) and 19% took more than five drugs (26.4% of those > 65 years). In total, 54% of the patients had some discrepancy between the medications recorded in the DMR and those in the MMR (48.4% for those ≤65 years and 64.7% for those >65 years). The rate of participants who omitted some drugs was higher for those >65 years. The drugs most omitted from the DMR were analgesics/opioids, antihypertensives and anxiolytics/hypnotics/sedatives.

Conclusions: It is imperative to access the MMR of patients requesting dental care because a significant number of medications are not reflected in their DMR. These discrepancies may be particularly common and relevant in elderly patients, in whom multimorbidity and polypharmacy are more frequent.

KEYWORDS
dental record, elderly, medical record, medication

1 | INTRODUCTION

The progressive aging of the population is an expression of the advances in medicine, technology and public health and presents significant challenges for society.[1] This demographic challenge is accompanied by a change in morbidity patterns, with an increase in chronic noncommunicable diseases over communicable diseases.[2] The aging of the population represents a new scenario for healthcare practitioners, which will have to address the problems resulting

from multimorbidity, polypharmacy (the daily consumption of 5 or more drugs)[3] and potentially inappropriate prescription (where the potential harm outweighs the potential benefit).[4]

The importance of the medication that a dental patient consumes lies in three fundamental pillars: (1) It can provide information on a systemic disease that affects the dentist's actions and treatment plan,[5] (2) it can cause undesired reactions in the oral cavity and adjacent tissues,[6] and (3) it can cause drug interactions with the drugs the dentist intends to prescribe.[7]

Globally, it is estimated that one of every three adults experiences a chronic disease.[8] The main conditions responsible for morbidity and mortality are ischemic heart disease, stroke, chronic obstructive pulmonary disease, Alzheimer's disease and diabetes.[9] Additionally, a number of these conditions are grouped more frequently than expected (multimorbidity), as is the case with depression, stroke and Alzheimer's disease.[8] The complexity of dental treatment in the elderly increases due to the complications resulting from these diseases when they become chronic. Accordingly, the approach to the medical problems of old age is a preferential topic in Gerontology educational programs.[10]

The adverse drug reactions include certain oral lesions, whose pathogenesis in many cases has not been definitely determined but which in general are considered a relatively common phenomenon.[11] The most common oral manifestations secondary to the administration of commonly used drugs are xerostomia, dysgeusia and stomatitis,[12] although there is a broad spectrum of unusual oral manifestations.[13] Any medicinal product is susceptible to causing these types of reactions, which are often considered trivial by healthcare practitioners but that can have extraoral implications and be confused with the oral manifestations of a systemic disease.[6]

Within the framework of their professional practice, dentists are frequently in contact with patients who are taking drugs that can interact with those that are typically prescribed in a dental consultation.[7] Compared with the medical practice, there is not as large a volume of interactions in the dental setting, given that the dental treatments have a short duration and the drugs prescribed by dentists come from a much smaller number of pharmacological groups.[14] However, drug prescription in Dentistry requires consideration of the potential onset of interactions, especially in patients older than 65 years, for whom the prevalence of polypharmacy can exceed 30%.[15]

To date, few articles have been published on the list of drugs that appear in the dental medical records of adult patients and the records' accuracy compared with the medical record.[16,17] Choi et al.[16] selected 100 low-income adults and evaluated the discrepancies between the medication history (performed by a dentist or a dental assistant under supervision) and the results of a medication interview performed by a pharmacist; the results focused on oral adverse effects, interactions with local anesthetics/vasoconstrictors and potential bleeding effects. Although 26% of participants were older than 65 years, no specific comment was made in this study about the results from older adult patients. Tenuta et al.[17] studied the degree of concordance in the reporting of medications between the electronic medical and dental records of 27 277 patients older than 18 years treated at the University of Michigan medical and dental clinics. An external programmer extracted the data and prepared specific Python scripts to detect a total of 16 medications in the electronic records (the 13 most prescribed, as well as insulin, warfarin, and sidenafil). One of the weaknesses of this study is that the dental record relies on patient self-reports, and there are also no specific comments concerning the relationship between the results and the age of the patients. The societal determinants of health have been associated with the discrepancies in the medication list and the list of diseases recorded in the dental history,[18] which justifies the implementation of new studies in various settings.

The hypothesis of this study is that there can be discrepancies between the drugs reported by patients in their dental history and those recorded in their medical history, particularly for people older than 65 years.

2 | MATERIALS AND METHODS

2.1 | Selection of patients

The study's participants were selected prospectively and consecutively from the patients who requested dental care from the Dental Clinical of the University of Santiago de Compostela (Spain) between September 2022 and May 2023, in the framework of clinical practices performed by the students of the last year of the Dental degree.

The applied inclusion criteria were an age greater than 18 years, having no manifested intellectual disability that would impede the understanding of the study's content, having access to health care in the public health system and explicitly allowing the handling of personal information for research purposes (informed consent).

Initially, 125 patients were assessed, 25 of whom were excluded for not meeting the inclusion criteria. Ultimately, a convenience study group of 100 patients (55 women and 45 men) was created, 66 of whom were 18–65 years of age with the remaining 34 patients over 65 years of age.

All participants underwent a structured medical history review, which expressly included questions on the consumption of drugs, such as "Do you take any medication?",

"If the answer is yes, what drugs do you take?", "At what dose?" and "How often?" This information was called the "dental medication record" (DMR).

The "IANUS" software platform (a software tool of the Galician Public Health Department [Galicia, Spain] to manage electronic medical records) was accessed and the reports of physician-prescribed active medications that each participant consumed were compiled. This information was called the "medical medication record" (MMR).

2.2 | Pharmaceutical logs

All drugs that appeared in each patient's dental and medical records were recorded, except for topical medication such as eyedrops, certain active ingredients such as vitamins, sanitary products (gauze, diapers, compression stockings, blood glucose test strips, etc.) and health and beauty products such as green tea.

Once the available data in both records were compiled, the total number of drugs that appeared in each of these records was quantified. The patients who took no medicinal products were also included in the study and were attributed a null consumption of drugs.

To label the recorded drugs, the European Anatomical, Therapeutic, Chemical (ATC) classification system was employed; this encodes pharmaceutical substances and medication into five levels, depending on the system or organ upon which it acts, its pharmacological effect, the therapeutic indications and the chemical structure.[19] Each drug has a corresponding ATC code, which is specified in its datasheet.

2.3 | Ethics committee

The study protocol was approved by the Regional Research Ethics Committee of the Government of Galicia (registration code 2016/123). Each participant filled out an informed consent form before their data were collected. All reviewed records and information directly provided by the patients were handled in an anonymized manner.

3 | RESULTS

3.1 | Consumption of drugs

As reflected in the electronic medical records, 20% of the patients consumed no drug, 41% consumed 1–3 drugs, 20% consumed 4–5, and the remaining 19% consumed more than 5 drugs. The mean consumption was 3 drugs per patient. Sixteen percent of the women consumed no drugs, compared with 24% of the men. The most noticeable difference by sex was observed between the patients who took more than 5 drugs (25% of the women compared with 11% of the men).

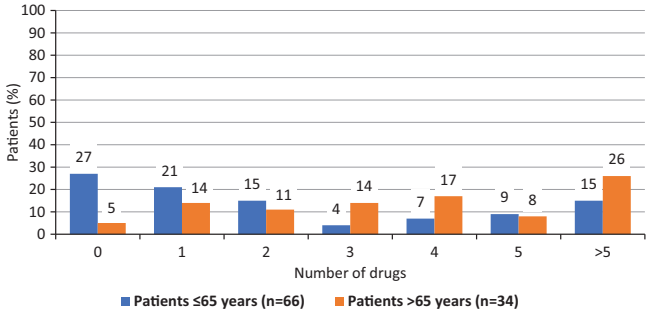

FIGURE 1 Total consumption of drugs by patients according to the MMR, as a function of age group. MMR, medical medication record.

Table 1 lists all the drug groups identified in the medical records. The most often consumed drug groups (25%–36% of the patients) were, in decreasing order, hypolipidemic agents (36%), antihypertensives (30%), anxiolytics/hypnotics/sedatives (28%), gastroprotective agents (27%) and antidepressants (25%). The most often consumed drugs, by decreasing order, were atorvastatin (19%), omeprazole (16%), thyroid hormones (11%), acetylsalicylic acid (10%) and simvastatin (8%).

Among patients aged ≤65 years, 72.8% were taking at least 1 drug, 36.1% 3 or more drugs, and 15.1% more than 5 drugs (Figure 1). Some 94.2% of the patients older than 65 years consumed at least 1 drug on a regular basis. The consumption was spread out as follows: two patients (5.8%) consumed no drug, 14 (41.1%) consumed 1–3, 9 (26.4%) consumed 4–5, and the remaining 9 (26.4%) consumed more than 5 drugs (Figure 1).

Discrepancies between the DMR and the medical record (MMR)

Considering the study group as a whole ($n = 100$), 50% of the patients did not declare at least 1 drug to the dentist among those that appear in their MMR, 20% omitted 3 or more drugs, and 5% omitted 5 or more drugs. Forty-five percent of the women omitted some drug that they consumed, compared with 56% of the men; paradoxically, 17% of the women omitted at least 4 drugs, compared with 8% of the men.

In total, 54% of the patients had some discrepancy between the medications recorded in the DMR and those recorded in the MMR. This percentage was 48.4% for the patients 65 years and younger and rose to 64.7% for those older than 65 years. The rate at which the participants forgot to mention 2, 3 or more than 5 drugs was higher for the patients older than 65 years (Figure 2).

TABLE 1 Drugs consumed by the study participants (according to the European Anatomical, Therapeutic, Chemical [ATC] classification system).

Blood and hematopoietic organs	Systemic hormonal preparations, excluding sex hormones and insulin
Vitamin K antagonists	Systemic corticosteroids
Platelet aggregation inhibitors	Thyroid hormones
Direct factor Xa inhibitors	**Antineoplastics and immunomodulators**
Bivalent iron	Endocrine therapy
Vitamin B_{12} and folic acid	Immunosuppressants
Cardiovascular system	**Musculoskeletal system**
Antiarrhythmic agents, classes I and II	Non-steroidal anti-inflammatory drugs
Vasodilators used in heart disease	Muscle relaxants
Other heart preparations	Bisphosphonates
Alpha adrenergic receptor antagonist antihypertensives	Antiangiogenic and antiresorptive agents
Diuretics	**Nervous system**
Peripheral vasodilators	Local anesthetics
Vasoprotective agents	Analgesics
Beta blockers	Opioids
Calcium channel blockers	Opioids combined with non-opioid analgesics
Angiotensin-converting enzyme inhibitors (ACEIs)	Other analgesics and antipyretics
ACEIs and diuretics	Antimigraine agents
Angiotensin II receptor blockers (ARBs)	Antiepileptic drugs
ARB and diuretics	Antiparkinsonian agents
ARBs and calcium channel blockers	Antipsychotics
HMG-CoA reductase inhibitors	Anxiolytics
Fibrates	Hypnotics and sedatives
Hypolipidemic agents	Antidepressants
Respiratory system	Psychostimulants
Nasal decongestants	Drugs used in addiction disorders
Inhaled bronchodilators	Antivertigo agents
Systemic bronchodilators	**Alimentary canal and metabolism**
Systemic antihistamines	Agents for treating abnormalities caused by acids
Genitourinary system and sex hormones	Biliary and hepatic therapy
Systemic hormonal contraceptives	Insulins and analogs
Urological products	Oral hypoglycemic agents
Medication for benign prostatic hyperplasia	Vitamins
Anti-infectives for systemic use	**Antiparasitics, insecticides and repellents**
Antiretrovirals	Antimalarials

The most commonly omitted drug groups in the DMR by the study participants were, in decreasing order, analgesics/opioids (12 of 16 patients; 75%), antihypertensives (13 of 30 patients; 43.3%) and anxiolytics/hypnotics/sedatives (11 of 28 patients; 39.2%).

The most commonly omitted drug groups in the DMR by the study participants over 65 years of age were, in decreasing order, antihypertensives (9 of 30 patients; 30.0%), statins (7 of 24 patients; 29.1%) and proton pump inhibitors (5 of 23 patients; 21.7%). These results are presented in Table 2, together with the underlying diseases specifically treated with these omitted drugs and which affect dental management of these patients, the oral adverse reactions caused most frequently by them and the potential interactions of these omitted drugs with those commonly prescribed by dentists.

TABLE 2 Drugs omitted by two or more study participants aged over 65 years (according to the European Anatomical, Therapeutic, Chemical [ATC] classification system).

Omitted drugs (number of patients)	Related systemic diseases[a]	Undesirable oral reactions	Drug interactions[b]
Antihypertensives ($n = 9$)	Hypertension[20]	Xerostomia[21] Salivary glands swelling[22] Dysgeusia[22] Lichenoid reactions[23] Angioedema[24] Mucositis[22] Tooth pigmentation[22] Pemphigus[25] Mouth ulcers[26]	Epinephrine[27,28] NSAIDs[29–32]
Statins ($n = 7$)			Antibiotics[33] Antifungals[33]
Proton pump inhibitors ($n = 5$)			Antifungals[34]
Antiplatelet agents ($n = 3$)	Risk of bleeding[35,36]		NSAIDs[37,38]
Antidepressants ($n = 3$)		Dry mouth[39] Black hairy tongue[40]	Epinephrine[14,41] NSAIDs[42,43] Anxiolytics[14]
Benzodiazepines ($n = 3$)		Reduce salivary flow[44]	Local anesthetics[45] Antifungals[46] Anxiolytics[14]
Insulin ($n = 2$)	Diabetes[5,47,48]		
Metformin ($n = 2$)	Diabetes[5,47,48]	Metallic taste[6] Dysgeusia[6]	Antifungals[49]
NSAIDs ($n = 2$)		Fixed drug eruption[50]	Antibiotics[7]

Abbreviation: NSAIDs, nonsteroidal anti-inflammatory drugs.

[a]Systemic diseases that can affect the dentist's actions and treatment plan.

[b]Potential interactions with the drugs the dentist intends to prescribe.

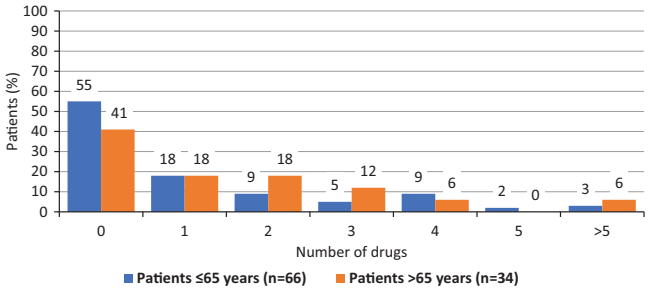

FIGURE 2 Number of drugs by patients that did not appear in the DMR but did appear in the MMR, as a function of age group. DMR, dental medication record; MMR, medical medication record.

4 | DISCUSSION

This study confirmed that practically all patients over 65 years of age consume some drug on a regular basis and that 1 of every 4 are polymedicated. Nearly two of every three patients (64%) failed to report to the dentist some of the medications recorded in the MMR, a percentage similar to the 71% detected by other authors.[16]

Some patients omit relevant medical conditions when conducting the dental history.[51,52] It is therefore highly relevant to record in the medication list all those specifically suggestive of a systemic disease such as antihypertensives and antidiabetic agents (Table 2). A number of series have indicated that up to 29% of patients failed to report their hypertensive condition to the dentist,[20] and diabetes was not reported to the dentist by up to 15% of the affected patients.[20] The percentage of patients who did not report any drug with potential effects on bleeding (i.e., antithrombotic agents) was similar to that observed by other authors.[16]

It has been suggested that, with the aging of the population and as new medications become available, dentists will increasingly encounter drug-related oral side effects[53] (Table 2). Antihypertensives (not declared by 30.0% of

patients over 65 years of age taking these agents) can cause a broad spectrum of oral reactions.[21–26] In a previously published series, the correlation between the DMR and MMR regarding losartan, hydrochlorothiazide and amlodipine was 10%, 32% and 34%, respectively.[17] Sedatives and in particular benzodiazepines, as well as antidepressants such as duloxetine, bupropion and nonselective monoamine reuptake inhibitors can reduce unstimulated and stimulated salivary flow[44] and produce dry mouth.[39]

Elderly individuals run a greater risk of adverse drug reactions due to metabolic changes and reduced clearance of the drug, a risk that is accentuated in cases of polypharmacy.[54] To focus these interactions, our analysis was limited to the drug groups most often prescribed by dentists: local anesthetics, analgesics, antibiotics, antifungals and anxiolytics[55] (Table 2).

This study provides evidence of a significant percentage of older adult patients who have a discrepancy between the drug consumption declared when preparing the dental record and the actual consumption recorded in their medical record. This result confirms those of previous studies performed both in cohorts of children (parent-reported information)[18,56] and of adults.[16,17] Unreported medication issues are particularly common in older and multimorbid patients.[57] Although to the best of our knowledge no series concerning discrepancies between DMR and MMD have been reported previously, specifically in elderly patients, it can be supposed that patients aged >65 years are under-represented in the present study. However, participants were selected consecutively, therefore their age distribution is representative of patients attending a conventional adult clinic in Spain (where dental clinics exclusively for the elderly do not exist) and the percentage of patients aged >65 years included in the present series was higher than in previous publications.[16]

Although the reasons for these discrepancies between DMR and MMD remain unclear, it has been suggested that keeping separate medical and dental records may contribute to inaccuracies in medication reports.[17] There is currently very little information available regarding the significance of such discrepancies on clinical dental procedures, adverse oral effects and drug interactions.[16] To help alleviate these discrepancies, various strategies have been suggested, such as combining patient-reported medical histories and medical consultations, an integrated electronic health record containing a dental record module, and a regional healthcare information exchange.[58]

Implementation of the electronic medical record has not resulted in the absence of discrepancies in medication lists.[59] Among the most common reasons for dental providers to seek medical consults, almost 40% are related to medication information and 1 out of every 4 requests concern medication lists.[60] However, this is ineffective given that numerous attempts are typically required to contact medical providers, the information is often incomplete, and the process is markedly delayed in 25% of cases.[60] It has been suggested that the intervention of pharmacists in the medication conciliation process might help to improve the accuracy of the medication lists available to dentists.[16] It has also been proposed that, to avoid discrepancies between DMR and MMR, information concerning medications should be shared between medical and dental health record data,[61] or better still, the medical and dental information for each patient should be included in a single unified electronic health record.[17,20]

Although none of these strategies has resolved the problem definitively, it will probably soon be minimized as a result of technical innovations that already allow patients to download the list of active medications directly to their mobile phone or allow the pharmacist to provide patients who have difficulties using new technologies (typically elderly patients) with a photo or print-out of their current list of medications.

This study is not exempt from certain limitations, which require caution when interpreting the results. The selected patients requested dental care in a university clinic, which typically entails certain socioeconomic and/or cultural connotations. The fact that the study was conducted at a single institution has its disadvantages (sample size) but has the advantage that the study group and researcher team were more homogeneous. Generally speaking, a person aged 65 years or more is usually considered to be "elderly"[62,63]; however, the United Nations uses a variable cut-off point, defining elderly persons as those aged 60 or 65 years or more[64]; consequently, the use of 65 years as a cut-off point could represent a potential bias in this study. The DMRs were performed by highly experienced practitioners (20–35 years) but not calibrated, which does not ensure a standardized collection of information or an adequate adaptation to each patient's personal characteristics, especially when considering elderly patients. The cross-sectional nature of the collected information overlooks drug histories that might be relevant, such as the case of a patient who consumed bisphosphonates until a few months before the start of this study. Moreover, this is a pilot study in the classic sense of "a small-scale test of methods and procedures to assess the feasibility/acceptability of an approach to be used in a larger scale study"[65]; the authors are fully aware of the limitations of a pilot study of this nature to estimate the size effect, calculate the power or perform exploratory efficacy analyses.[65]

5 | CONCLUSIONS

Despite the technological advances that have been applied to health registries in the past few years, discrepancies between DMR and MMR are common. Their importance lies in the fact that some undeclared medications can be indicative of systemic diseases that affect dental management or the onset of complications, could cause undesirable oral adverse effects and might generate interactions with the drugs prescribed by the dentist. The results of this pilot study allow the speculation that these discrepancies might be particularly common and relevant in elderly patients, in whom multimorbidity and polypharmacy are more frequent; however, a new study with a larger sample size is essential to be able to confirm these findings.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

INSTITUTIONAL REVIEW BOARD STATEMENT

The study protocol was approved by the Regional Research Ethics Committee of the Government of Galicia (registration code 2016/123).

INFORMED CONSENT STATEMENT

All of the patients completed and signed a specific informed consent form for study participation.

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