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Common medications among dental outpatients – an update

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Abstract

Background and Objectives: To provide safe and professional care for dental patients, it is necessary to obtain a comprehensive medical history as an essential part of treatment planning. This should include details on medication use, adverse drug reactions/allergies, and previous hospitalisations. The number of medically-compromised older New Zealanders is rising, and they are now more likely to retain their teeth as they age. Dental clinicians will increasingly be required to care for this population group. The aim of this paper is to report on the most common medications among dental outpatients (2012-2019) at the University of Otago Faculty of Dentistry.

Methods: Outpatient files from urgent care and routine exodontia clinics were reviewed retrospectively and analysed descriptively.

Results: Data for 350 patients were included for analysis. Nearly half were female and age ranged from 5 to 94 years (mean = 39). Over half of the patients (n=198) reported currently taking at least one medication. The highest number of reported medications was 11 (mean = 1.62). The average number of medications taken did not significantly differ by sex. A total of 139 different medications were taken, and the ten most frequently reported medications were paracetamol, aspirin, the combined oral contraceptive pill, ibuprofen, atorvastatin, metoprolol, cilazapril, omeprazole, salbutamol, and fluticasone propionate. Fluticasone propionate, not previously featured, is further discussed. The five most common supplements were vitamin D, iron, folic acid, multivitamins, and vitamin B.

Conclusion: Future research should investigate this question at the national, rather than regional level, and ensure a sufficient sample is taken to allow conclusions to be drawn about medication use among key subgroups of dental patients, including older people and ethnic groups.

Introduction

Advances in contemporary medicine have enabled clinicians to manage patients with chronic disease more successfully with the advent of newer therapeutic agents. This has resulted in both an increase in life expectancy and an increasing prevalence of patients with complex coexisting morbidities (Dawoud et al., 2014). While medications have intended therapeutic benefits, the greater the general systemic effect, the greater the chance of adverse reactions and other side effects. Dentists and oral health practitioners should be aware of how different medications affect the oral cavity and the implications for the provision of oral health care for both patient and clinician. There is also the risk of drug interactions with medications that dentists may prescribe, increasing with the number of medications prescribed (Fitzgerald et al., 2015).

Medical history taking is essential to providing appropriate patient care. As part of the treatment planning process, a careful and thorough history of medications and overall health should be obtained, inclusive of systemic disease, adverse drug reactions or allergies, and previous hospitalisations. Although there are no legal requirements regarding the frequency of medical history taking, clinical judgement dictates updating the general health and disease status of patients on a regular basis. It is the clinician's responsibility to obtain a complete patient medical history and this may require the dentist to be more proactive. An example is when a patient may not recall the full details of their medications, or fail to report over the counter (OTC) medications and supplements, dismissing their relevance. In such circumstances, medical details must be clarified with the patient, possibly in consultation with the patient's medical practitioner, pharmacist, or close family members (Qato et al., 2008; Fitzgerald et al., 2015). After patient consent is approved, often the patient's medical practitioner can supply a full list of medications prescribed and a list of the patient's medical conditions.

In a previous study of medications taken by dental outpatients, Cutfield and Tong (2012) identified eleven medications, prescription and otherwise, that were most frequently encountered at a tertiary level dental institution. Ten of these medications appeared amongst the top twelve medicines by prescription number in the 2012 Pharmaceutical Management Agency of New Zealand (PHARMAC) annual review (Pharmac, 2012). The only medication failing to appear was the combined oral contraceptive pill (COCP). Albeit at some descending rankings, these ten medications are still listed amongst the top twenty in the most recent annual review (Pharmac, 2017). It should be noted that this list does not include OTC medications, supplements, or alternative remedies.

The greatest risk factor for medication-related problems is the number of medications a person is consuming, therefore greater awareness is important among clinicians in terms of familiarity with commonly prescribed medications. The challenge of polypharmacy is becoming more prevalent and increasing rapidly over

the last decade. In 2005, over half (53%) of American adults were taking five or more medications–inclusive of prescription medications, OTC medications, and dietary supplements (Steinman, 2016). This figure jumped to 67% just five years later. With this increase in polypharmacy and the ageing but dentate New Zealand population, the general dental practitioner will need a robust knowledge of medications, their indications, and potential interactions (Dawoud et al., 2014).

The release of online databases such as the New Zealand Universal List of Medicines (NZULM) in 2010 (URL: https://info.nzulm.org.nz/) and the New Zealand Formulary (NZF) in 2012 (URL: https://nzf.org.nz/), provide an web-based resource of medicines approved for supply in New Zealand.

These are freely available to healthcare professionals and the public, and are intended to provide guidance on best practice for those prescribing or administering medicines. These websites also allow the user to check possible drug interactions and contraindications with ease.

The purpose of this current study was to provide a five-year update (2014 to 2018) on the most commonly reported medications among patients presenting at a dental outpatient clinic at a tertiary institution since the last study by Cutfield and Tong (2012). The previous study described the most frequently reported medications in detail, therefore this current update will only describe new medications not seen in 2012. For novel medications, this study will review generic and common trade names, prescription indications, and considerations required in dental treatment planning. This study will also explore the demographics of age, gender and ethnicity–aspects of which were inadequately recorded in the previous paper.

Methods

A retrospective review of outpatient files from the Urgent Care Clinic (UCU, for acute or emergency dental problems) and routine exodontia clinics at the School of Dentistry, University of Otago was conducted. Ethical approval (Ethics application(B)_ 180521) and research consultation with Māori was obtained through the University of Otago. A retrospective analysis of records for drop-in patients seen in UCU was performed until data from 350 patients was obtained. Exclusion criteria included an inadequately recorded medical history and/or lack of ethnicity disclosure, or had been referred to UCU for specialist consultation or treatment. Patients attending the two outpatient clinics were not screened prior to the visit, unlike the patients seen by other undergraduate clinics.

Data on patient age, ethnicity, gender, current medical conditions, and all reported medications at time of presentation were recorded, including prescription, OTC, and herbal medicines. Descriptive analysis was conducted and Chi-Square and Fisher's Exact tests were used to test for statistical significance of differences in medication use by sex. Negative binomial regression was used to model the count of medications taken by age, sex, and ethnic group while logistic regression was used to model the odds that participants took one or more medications in each medication class.

Results

Of the 350 patients, 172 patients were female, 177 patients were male, and 1 patient was transgender. The age of patients ranged from five to 94 years, with a mean age of 39 years and a median age of 34 years (Figure 1). A third of participants were aged 20-29 years. By ethnicity, 73.1% were European/Pakeha, 10.3% Māori, 2% Pacific Islander, 9.4% Asian, and 5.1% MELAA (Middle Eastern/Latin American/African).

A total of 139 different medications (prescription or otherwise) were identified from 350 patients. The mean number of medications was 1.6 among the total 350 patients. However, 152 patients had no reported medications, while others reported between one and eleven medications (mean 2.8, sd 2.3 among those who took medications) (Figure 2). At least one medication was taken by 59.8% of European, 55.6% of Māori, 42.9% of Pacific Islander, 45.5% of Asian, and 38.9% of MELAA patients. The average number of reported medications for each ethnic group was greatest among MELAA (mean 1.9, sd 3.5) and Pasifika patients (mean 1.9, sd 2.4) followed by New Zealand Europeans (mean 1.8, sd 2.3), Māori (1.1, sd 1.6) and Asians (mean 0.6, sd 0.8).

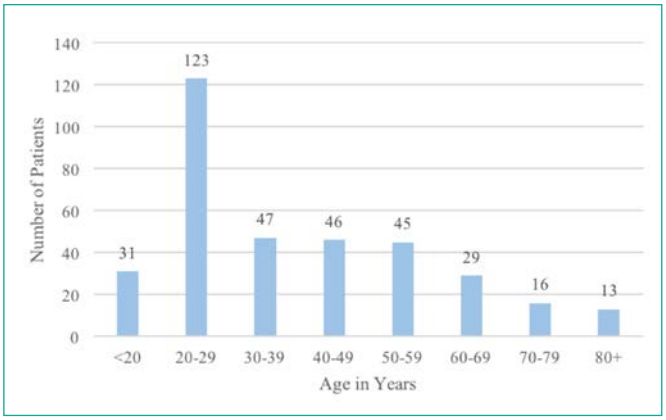

Figure 1. Patient age distribution

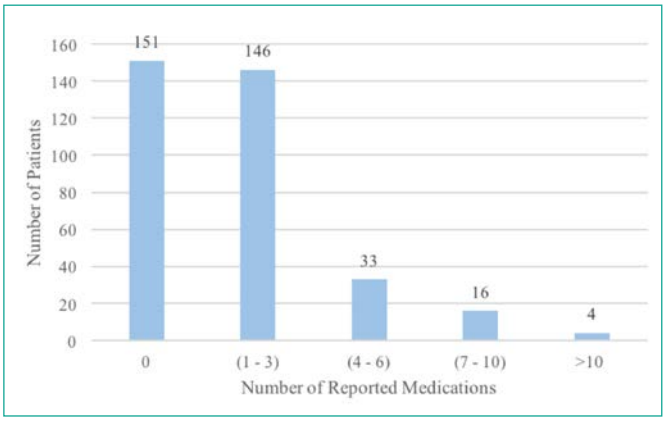

Figure 2. Number of medications taken per patient

Table 1. Most frequently-reported medications

Medication – any type (% taking)	Prescription medicines (% taking)	Supplements (% taking)
Paracetamol (12.6)	COCP (6.9)	Vitamin D (3.1)
Aspirin (8.6)	Atorvastatin (5.1)	Iron (1.7)
Ibuprofen (7.1)	Metoprolol (4.9)	Folic acid (1.1)
COCP (6.9)	Cilazapril (4.6)	Multivitamin (1.1)
Atorvastatin (5.1)	Omeprazole (4.6)	Vitamin B (1.1)
Metroprolol (4.9)	Salbutamol (4.3)	
Cilazapril (4.6)	Fluticasone propionate (3.7)	
Omeprazole (4.6)	Codeine (2.9)	
Salbutamol (4.3)	Citalopram (2.6)	
Fluticasone proprionate (3.7)	Allopurinol (2.0)	

Regression modelling of age was an important determinant of medication use (P<0.05) (Figure 3).

The ten most common medications were paracetamol, aspirin, the COCP, ibuprofen, atorvastatin, metoprolol, cilazapril, omeprazole, salbutamol and fluticasone propionate. Paracetamol made up almost a tenth of all medications (8%) reported and was taken by 12.6% of patients. The ten most common prescription-only medications were COCP, atorvastatin, metoprolol, cilazapril, omeprazole, salbutamol, fluticasone propionate, codeine, citalopram, allopurinol. The five most common supplements were vitamin D, iron, folic acid, multivitamins, and vitamin B (Table 1).

Reported drugs were classed according to the PHARMAC online pharmaceutical schedule, then ranked. The three most frequently reported drug classes were nervous system medications, cardiovascular system medications, and alimentary tract and metabolism medications (Figure 4).

Logistic regression identified associations between age (per year, continuous measure) and use of alimentary tract and metabolism drug class medications (OR 1.059, CI 1.04-1.07), blood and blood forming organs drug class medications (OR 1.075, CI 1.03-1.12), cardiovascular system drug class medications (OR 1.14, CI 1.10-1.18), hormone preparation drug class medications (OR 1.03, CI 1.01-1.05), musculoskeletal system drug class medications (OR 1.02, CI 1.01-1.04), and nervous system drug class medications (OR 1.03, CI 1.02-1.05). Use of genito-urinary system drug class medications was strongly associated with being female (OR 14.59, CI 3.36-63.07), and inversely associated with age (OR 0.97, CI 0.94-0.99).

An average of 2.8 medications were taken by the 88 males who took one or more medications, while an average of 2.9 medications were taken among the 109 females. After controlling for age, females were more likely to take one or more medications than males (P<0.05). In terms of specific medications,

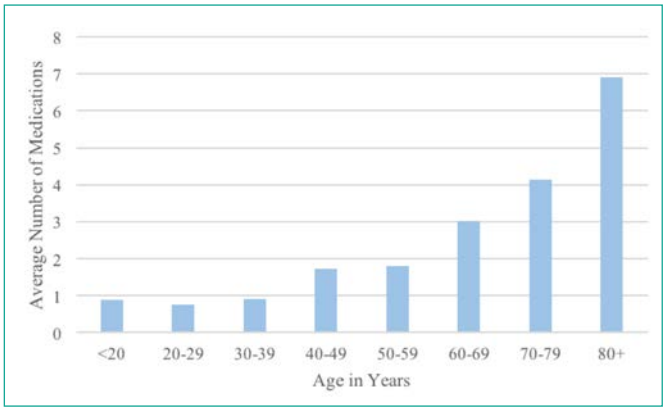

Figure 3. Average number of medications taken by age group

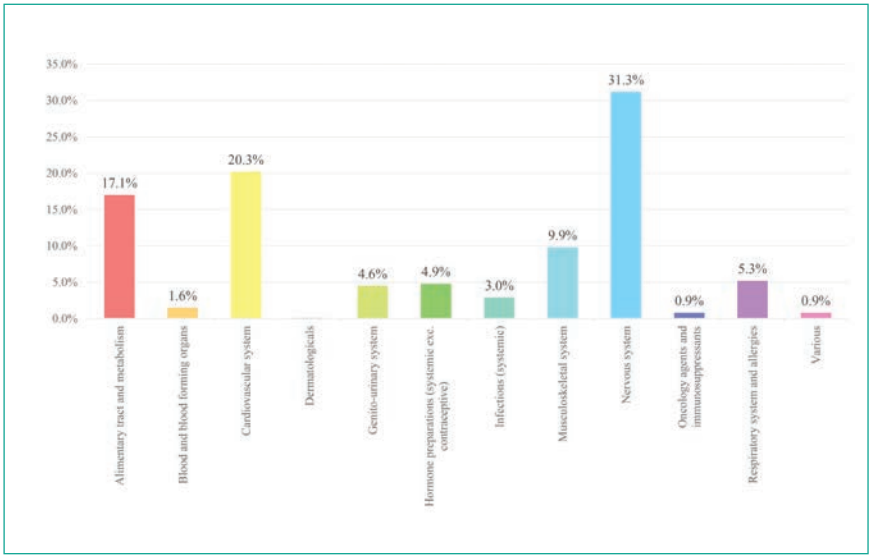

Figure 4. Reported combined drug classes

allopurinol and amlodipine were more frequently taken by males, while the COCP was solely reported by females. Despite amlodipine being more commonly taken among male patients it did not however, make the top 10 medications.

Discussion

Medication use among dental outpatients seen at the School of Dentistry during 2018 was high, but similar to the proportion reported 6 years earlier (Cutfield and Tong, 2012). Polypharmacy was common and the mean number of medications among the total sample population was 1.6, which was the same in 2012.

This study has some limitations, including the small sample size and the potential lack of generalisability with the wider population. The sample population was predominantly European, with relatively low representation of Māori, Pacific, and Asian groups reflecting characteristics of the population of Dunedin (Statistics New Zealand, 2013).

The most common conditions for which medications were prescribed or taken included neurologic, psychological, cardiovascular, alimentary tract and metabolic diseases. Between 2006 and 2014, the rate of diagnosis of mood and anxiety disorders increased significantly from 13% to 18%, with females having two times greater risk than males, and one in eight Pacific adults having a high probability of a mood or depressive disorder (Ministry of Health, 2014). The common use of psychological medications may reflect this increase in the diagnosis of mental health disorders.

The previous study by Cutfiled and Tong (2012) did not include what drugs were taken according to specific groups within the general population and this has been included in this study using the New Zealand Health Survey (Ministry of Health, 2014). According to 2014 national data, 16% of adults were on anti-hypertensive medications; 11% were taking cholesterol-lowering medications and 11% were on medications for asthma. Māori and Pacific Island peoples were over-represented in all these groups. Our study had slightly lower numbers of 13% on anti-hypertensive medications, seven percent on cholesterol lowering medications and seven percent on asthma medications.

As many of the medical histories reviewed comprised solely of a list of medications (prescription and non-prescription), drug class indications are often used to infer their therapeutic purpose in evaluating gradients. Therefore, it is important that a medical history must be as comprehensive as possible and include the reason for taking the medication, as many common medications have more than one therapeutic indication. Also of note, off-label prescription has been shown to be highest for cardiac medications and anticonvulsants and in one study, up to 21% of 160 medications prescribed in the United States were off-label (Radley et al., 2006).

There was a significant association between the reporting of medications of certain drug classes and age according to our calculation of odds ratios (OR). The use of medications within six drug classes increased with each year of age, namely those involving the alimentary tract and metabolism, blood and blood forming organs, cardiovascular system, hormone preparations (systemic), musculoskeletal system and nervous system.

Nine of the medications featured in the previous study's ten most frequently reported medications (prescription or otherwise) again featured in this update but with altered rankings (Table 1). Kantor et al. (2015) evaluated trends in prescription drug use among American adults from 1999 – 2012 and their top ten prescription medications were simvastatin, lisinopril, levothyroxine, metoprolol, metformin, hydrochlorothiazide, omeprazole, amlodipine, atorvastatin, and salbutamol. They also reported an increase in prescription drug use and almost double the prevalence of polypharmacy over this period. Our data trends follow a similar pattern to that of the top twenty prescribed medications released in the annual PHARMAC review. There may be a strong suggestion that national drug subsidies influence prescribing trends by physicians (Arroll et al., 2005).

Coupled with the under-representation of supplements relative to the 2008/2009 New Zealand Adult Nutrition Survey (Ministry of Health, 2011), patients are more likely to disclose prescription medications rather than OTC medications and/or supplements. Fitzgerald et al. (2015) suggested patients do not think OTC medications and supplements are of relevance to their dental treatment and so are not forthcoming with this information. Jou and Johnson (2016) reported that 25% of adults did not report herbs or dietary supplements to their physician. How information is obtained also has bearing with Hensrud et al (1999) reporting that only 30.5% of participants disclosed supplement use when completing a medical questionnaire while 61.0% disclosed supplement use when asked during a structured interview. Patients therefore should be specifically asked about dietary supplements, even when the information has been requested in writing. The contribution of this group of medications to polypharmacy could therefore be unrecognised and under-reported.

Oral analgesics (opioids and non-narcotics, including non-steroidal anti-inflammatory drugs) are commonly used by patients for management of acute dental pain (Hargreaves & Abbott, 2005). Ibuprofen and paracetamol are the most common non-narcotic analgesics used in dentistry, and are readily available as OTC medications (Hargreaves & Abbott, 2005). Paracetamol and ibuprofen were the first and third most frequently-reported medications (Table 1) but previous research reported them as second and ninth, respectively (Cutfield and Tong, 2012). As these data were obtained from clinical records of patients who had presented at UCU or exodontia clinics, there may be an over-representation of oral analgesics among this patient group due to the acute nature of the presenting dental problems. Patients also tend to 'self-medicate' for their acute dental symptoms and clinicians should ask what medications have been taken over the last 24 hours. Thomson et al. (2007) reported a high proportion of medications were self-prescribed among adults (ages 26 and 32), including 82% of analgesics, 85% of supplements,

71% of antihistamines, and 33% of anti-ulcer medications were self-prescribed. For this reason, potentially self-prescribed medications were not included in our analysis of prescription-only medications.

Directly comparing the ten most frequently-reported medications (prescription or otherwise) in this update to that of Cutfield and Tong (2012) revealed some notable differences. Simvastatin did not feature among the top ten in the current study but atorvastatin did. Compared to simvastatin, atorvastatin is nearly twice as potent and can be used to deliver more intensive lipid lowering therapy with lower risk of adverse effects (Mehta et al., 2016). Prior to 2010 however, atorvastatin was not fully funded by PHARMAC (Pharmac, 2010) and an application for funding was required only after a trial of simvastatin was given to the patient. The current funding of the more effective atorvastatin therefore, accounts for why simvastatin is not among our current top ten medications.

The cost of a medication to the patient is considered the most substantial factor influencing prescribing, with 90% of New Zealand general medical practitioners saying it had some or a strong influence on prescribing (Arroll et al., 2005). Similar findings have also been shown in the United States with factors such as changing population health needs, treatment advances and entrance of new medications to the market, clinical guidelines, and shift in policy on medication marketing and promotion all influence trends of medication use and polypharmacy within the population (Kantor et al. 2015).

Nearly all of the common medications reported in this study was the same as for the previous study in 2012 (Cutfield and Tong, 2012) which included overviews for the medications. We provide two overviews in this updated study – one for flucticasone proprionate, as it was the only new medication to make the top 10 list, but also for amlodipine due to its common use among males despite not being in the top 10 prescribed medication lists.

Generic name: **Fluticasone propionate**

Common trade names: Flixotide (inhalatory), Flixonase and Flonase (nasal).

Use and mechanism of action

Fluticasone propionate is a potent corticosteroid, which exerts its effects via the glucocorticoid receptor. After inhalation, fluticasone propionate has a potent anti-inflammatory action within the lungs, reducing the symptoms and exacerbations of asthma. Intranasally, it is used for the treatment and prophylaxis of allergic rhinitis, reducing inflammatory mediators in both early and late phase reactions (MIMS, 2018).

Dental considerations

Patients taking inhaled fluticasone propionate are at risk of throat irritation, hoarseness and oropharyngeal candidiasis (thrush). After inhalation, rinsing the mouth with water has been recommended to reduce risk of developing these adverse effects (Guggenheimer and Moore, 2009). When patients using oral corticosteroids for their asthma management are encountered, clinicians should assess the oral cavity for any of these oral complications. They must also be prepared for the management of an acute asthmatic episode as extrinsic triggers, such as stress and anxiety, are often associated with the dental setting. Patients may experience shortness of breath, wheezing and/or coughing. Preparing for and reducing the potential of an acute episode must include a complete history of the disease, including medications, frequency of episodes, hospitalisations and known trigger factors. Patients who use inhalers for asthma management should also be instructed to bring these devices to their appointments (Guggenheimer & Moore, 2009). Care should be taken to avoid the prescription of medications that may induce bronchospasm, for example, non-steroidal anti-inflammatory drugs (Lo et al., 2016).

Generic name: **amlodipine**

Common trade name: Norvasc

Use and mechanism of action

Amlodipine is a calcium channel antagonist that is used as a monotherapy or combined with other medications in the management of hypertension and myocardial ischaemia (stable angina and/or Prinzmetal's angina) (Medafe, 2020).

Calcium channel antagonists work by inhibiting calcium ion influx across cardiac and smooth muscle cell membranes resulting in peripheral and coronary vasodilatation, decreased heart rate and decreased rate of work in the myocardium (Umeizudike et al., 2017).

Dental considerations

The main dental consideration for amlodipine is the potential for drug- induced gingival hyperplasia.

The same mechanism of inhibiting calcium ion flux across the cell membrane is thought to be also responsible for drug-induced gingival hyperplasia as it alters collagenase function and synthesis (Bharti and Bansal, 2013). With the alteration of collagenase function, fibroblast stimulation is impeded to a lesser degree and in the presence of inflammatory cytokines, fibroblast activity increases resulting in gingival overgrowth. The importance of prevention with meticulous oral hygiene and regular dental visits to maintain plaque and calculus control is essential. Patients with established drug-induced gingival hyperplasia will require a specialist referral for debulking procedures either by scalpel, electrocautery, laser alone or in combination. Cessation of the medication may reduce recurrence but this will need to be discussed with the patient's medical practitioner.

Summary

In summary, the only new medication to make the top ten prescribed medication list was the inclusion of flucticasone proprionate inhaler. The updated lists of prescribed and non-prescribed medications and supplements are similar to the previous study, reflecting perhaps the funding of medications in New Zealand.

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