

The impact of systemic conditions and polypharmacy on older patients' oral health and dental treatment

Introduction

Systemic diseases can affect people of any age, but they are much more common in the elderly population and are likely to become an increasingly prevalent issue as a progressively larger proportion of the population is aged over 65 years.

The effects of systemic diseases and their pharmacological management can have a multitude of oral presentations and impact on dentists' ability to manage these patients' oral health needs. This article will discuss the effects of systemic diseases on the oral health of the elderly population, and how the general dentist can manage this patient cohort.

Cardiovascular system

The incidence of cardiovascular disease increases from around 40% in those aged between 40 and 59 years, to over 86% in those aged 80 years and above. Ischaemic heart disease due to narrowing of the coronary blood supply is the leading cause of mortality among those aged 65 and above, and can manifest clinically in several conditions, including angina pectoris and myocardial infarction. Relevant presentations of these conditions may include pain radiating to the head and neck region during an acute episode, but the primary dental relevance is through the pharmacological management of these conditions.¹ Antibiotic prophylaxis against infective endocarditis may be necessary for patients who meet the criteria outlined in Table 1 as per current American Heart Association (AHA) guidelines.²

Patients on anticoagulant or antiplatelet therapy require careful management with regard to extractions or procedures likely to induce significant bleeding (Table 2). The administration of local anaesthetic with adrenaline induces transient tachycardia and hypertension, and its use should be cautioned in patients with uncontrolled severe hypertension and uncontrolled congestive heart failure.³

Respiratory system

Chronic obstructive pulmonary disease (COPD) encompasses several respiratory conditions whereby airflow to the lungs is progressively limited. It is more common in the older population, and is almost always precipitated by an extensive smoking history.

Table 1: AHA guidelines for infective endocarditis antibiotic prophylaxis.

Cardiac conditions where prophylaxis is indicated:

- prosthetic cardiac valve;
- previous/current/relapsed infective endocarditis;
- cardiac transplantation patients who develop cardiac valvulopathy;
- any cyanotic heart disease; and,
- repaired cyanotic congenital heart defect with prosthetic material or with residual defect adjacent to site.

NB: When in doubt, consult the patient's cardiologist.

Prophylaxis is indicated for procedures involving:

- manipulation of gingival tissue or peri-apical region of tooth; and,
- perforation of oral mucosa including scaling and endodontics.

Prophylaxis is not indicated for procedures involving:

- local anaesthetic administration;
- taking dental radiographs;
- placement or removal of prosthodontic or orthodontic appliances/brackets;
- exfoliation of primary teeth; and,
- bleeding from trauma to lips/oral mucosa, including suture removal or superficial caries removal.

Antibiotics indicated – adults

- amoxicillin 2g po (i.e., 4 x 500mg tabs or 40ml of 250mg/5ml suspension);
- if penicillin allergic: azithromycin/clarithromycin 500mg po, or cephalexin 2gpo, or doxycycline 100mg po; and,
- if unable to take oral antibiotics: ampicillin 2g IM/IV or cefazolin 1g IM/IV.

Antibiotics indicated – children:

- amoxicillin 50mg/kg po (maximum dose 2g) as single dose 30-60 minutes before procedure;
- if penicillin allergic: azithromycin/clarithromycin 15mg/kg (maximum dose 600mg), or cephalexin 50mg/kg (max dose 2g), or doxycycline 2.2mg/kg (if under 45kg) (maximum dose 100mg); and,
- if unable to take oral antibiotics: ampicillin 50mg/kg IM/IV (maximum dose 2g), or cefazolin 50mg/kg IM/IV (maximum dose 1g).



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Table 2: Scottish Dental Clinical Effectiveness Programme (SDCEP) guidelines regarding bleeding risk and protocols.⁴

Procedures likely to induce bleeding (low risk): ■ simple (one to three) extractions; ■ incision/drainage of intra-oral swellings; ■ full periodontal examination; ■ root surface debridement; and, ■ direct/indirect restorations with subgingival margins.	Procedures likely to induce bleeding (high risk): ■ complex extractions; ■ adjacent extractions (three or more); ■ flap-raising procedures; ■ gingival recontouring; and, ■ biopsies.	Procedures unlikely to induce bleeding: ■ local anaesthesia administration; ■ BPE; ■ supragingival plaque/calculus removal; ■ direct/indirect restorations with supragingival margins; ■ endodontics – orthograde; ■ impressions/prosthetic procedures; and, ■ orthodontic adjustments/fittings.
Novel anticoagulants (NOACs): apixaban/dabigatran – generally twice daily. Miss morning dose, take evening dose as usual; and, rivaroxaban/edoxaban – generally once daily. Delay dose until at least four hours post haemostasis.	Antiplatelets: e.g., aspirin, clopidogrel Treat without interrupting medication but follow guidance outlined in general advice section. Vitamin K antagonists: e.g., warfarin International normalised ratio (INR) <4 (within 24 hours if unstable, within 72 hours if stably anticoagulated) Avoid if INR >4.	General advice: ■ limit initial treatment area; ■ staging extensive or complex treatments; ■ prophylactic packing and suturing of socket; and, ■ if in doubt, contact patient's GP or cardiology team.

While there are no specific oral manifestations of COPD, dentists should recommend that patients bring their inhalers to appointments and limit treating patients in the supine position as this can induce breathlessness.⁵ Similarly, the chronic use of steroid inhalers can predispose towards candida infections (**Figure 1**), so patients should be advised to rinse their mouth after each inhaler use.



FIGURE 1: Candida infection due to inhalers.

Xerostomia-related problems may also arise from this condition, including gingivitis and increased caries risk. In addition, a relationship between chronic periodontitis and COPD has been highlighted, with studies suggesting that better management of periodontal health is associated with fewer exacerbations of COPD.⁶

Diabetes/endocrine system

Diabetes mellitus is a rising issue among our increasingly ageing population. Of dental relevance, diabetic patients are at an increased risk of suffering hypoglycaemic episodes during treatment, so it is important to ensure that the patient has had sufficient food prior to treatment, as well as scheduling short morning appointments when endogenous cortisol levels are highest, and avoiding times of peak insulin activity (one to two hours post administration). There is long-described evidence demonstrating an association between uncontrolled diabetes and an increased incidence and severity of periodontal disease.⁷ Poorly controlled diabetes can also compromise the immune system

and predispose towards fungal infections, and in later stages, peripheral neuropathies may lead to altered or reduced taste and smell. In these cases, discussion with the patient's physician may be advisable before proceeding with dental treatment.

Patients on long-term corticosteroids for endocrine issues such as primary adrenal insufficiency may require supplemental glucocorticoids (100mg IM hydrocortisone) prior to dental procedures likely to induce stress, e.g., dental extractions. Liaising with the patient's GP is advised to ascertain an appropriate management plan in these cases.⁸

Neurological system

Transient ischaemic attacks and cerebrovascular accidents

Transient ischaemic attacks (TIA) and cerebrovascular accidents (CVA, i.e., strokes) are clinically similar conditions characterised by acute onset of focal neurological deficits lasting less than or more than 24 hours, respectively. The incidence of TIAs and CVAs increases with age.

The resultant disability following stroke can lead to diminished mobility and impaired communication.⁹

A prompt oral examination following stroke is advisable to identify dental hygiene needs and formulate an appropriate care plan. Stroke patients frequently report oral dysaesthesia, burning and pain, difficulties in co-ordination of oral hygiene activities and tolerating denture wear, and tendency towards oral candidiasis.¹⁰

Following a stroke, patients are generally placed on anticoagulant therapy to prevent further strokes from occurring. Historically, vitamin K antagonists such as warfarin were the mainstay of anticoagulant therapy and are still widely used in Ireland, especially among older patients. In these patients, INR must be carefully monitored, with dental procedures possible under the guidelines outlined in **Table 2**.

Dementia

Another neurological disorder encountered frequently among the elderly is dementia. It is most often caused by Alzheimer's disease, leading to progressive atrophy of the brain.

Dementia presents with loss of memory and comprehension, which progresses over time, leading to an inability to maintain adequate oral health practices, as well as difficulty communicating and identifying issues such as pain or difficulty eating. This makes dementia patients acutely susceptible to dental pathology.¹¹

Mental health

Elderly patients can be prone to mental health issues, for example depression, which can be caused by living with chronic medical illness, disability, family disruption, and feelings of social isolation. It has been evidenced that rates of depression, including among the elderly, have increased substantially since the onset of the Covid-19 pandemic.¹² People living with depression are more likely to exhibit neglect of their oral health in terms of daily hygiene, poor diet and irregular dental attendance. Moreover, the pharmacological management of depression can lead to dryness of the oral mucosa, resulting in discomfort and an increase in caries risk.¹³

Parkinson's disease

Older patients' co-ordination can also be affected in Parkinson's disease, a neurodegenerative disorder whereby loss of dopaminergic neurons within the basal ganglia leads to tremor, spasticity, and bradykinesia. Hypersalivation can occur in early stages of the condition, leading to drooling, while in later stages dysphagia is commonly reported.¹⁴ These, in combination with neck rigidity, can lead to challenges in the delivery of adequate dental treatment. For example, bite blocks may be utilised to maintain mouth opening, and physical activities such as squeezing a ball may help to reduce tremors. In addition, Parkinson's patients and others with affected manual dexterity may benefit from toothbrushes with modified handles (Figure 2).



FIGURE 2:
Example of
toothbrush with a
modified handle.

Cancer



FIGURE 3: Mucositis of lower labial mucosa and sulcus.



FIGURE 4: An example of MRONJ of the mandible.

Oral cancer incidence is rising, especially among the elderly, emphasising the importance of adequate training for the dental practitioner in screening. Chemotherapy and radiotherapy can have a deleterious effect on the oral cavity, with oral mucositis (Figure 3) being one such effect (a frequently debilitating

condition characterised by erythema, ulceration and oedema of the oral mucosa that lasts the duration of treatment). Cytotoxic medications such as 5-fluorouracil and methotrexate are associated with a particularly high incidence of mucositis.¹⁵ Effects can be reduced by:

- topical anaesthetics, e.g., lidocaine, 0.15% benzydamine hydrochloride mouth rinse;
- soft-bristled toothbrush;
- non-irritating fluoride toothpaste, e.g., BioXtra;
- eating frequent, soft, small meals;
- 5mg dissolvable Prednesol tablets for oral ulceration (held in mouth up to six times per day for five minutes at a time);
- zinc supplementation; and,
- opioid analgesia in severe cases.

Furthermore, the use of high-dose IV bisphosphonates, generally for bone involvement such as in cases of metastases in prostate cancer, is associated with medication-related osteonecrosis of the jaw (MRONJ – Figure 4). This has been covered in a previous article in this series.¹⁶

Bone disorders

Osteoarthritis/rheumatoid arthritis

Osteoarthritis (OA) is the most common form of arthritis, manifesting clinically as progressive joint pain and stiffness. Rheumatoid arthritis (RA) is an inflammatory autoimmune disorder affecting around 1% of the population, where the polyarthritis tends to present symmetrically. Both are generally managed via non-steroidal anti-inflammatory drugs (NSAIDs), although in severe cases of RA immunomodulatory agents may be required.

These arthritic disorders may affect patients' manual dexterity and consequently their oral hygiene. In addition, arthritic changes may occasionally be observed in the temporomandibular joint (TMJ), as well as the atlanto-axial joint in the cervical spine, which may be vulnerable to injury while lying supine for extended periods.

Osteoporosis

Osteoporosis is a progressive, systemic skeletal disease characterised by lowered bone density. Oral bisphosphonates, such as alendronic acid, are often used in the management of osteoporosis. As discussed with relation to malignancy, patients require a dental assessment prior to initiation of therapy, with any pertinent dental work to be carried out then. The risk of developing osteonecrosis is much lower with oral bisphosphonates than with intravenous treatment.¹⁷ A protocol for extraction planning and management in these patients is outlined by Prof. Finbarr Allen in a previous article in this series.¹⁶

Case report

A 68-year-old female attended the emergency clinic of Cork University Dental School and Hospital complaining of acute dentoalveolar pain related to the mandibular left second molar. Her medical history was significant: for atrial fibrillation she was taking apixaban 2.5mg twice daily; for hypertension and hypercholesterolaemia she was taking bisoprolol, perindopril and atorvastatin; and, for osteoporosis she was given twice-yearly denosumab injections. She had no known drug allergies, had never smoked and did not drink alcohol. On examination, the second molar tooth was grossly carious, with a diagnosis of pulpal necrosis and acute apical periodontitis. There was insufficient remaining

Table 3: An outline of some commonly prescribed medications and their potential oral/dental impact.

Condition	Medication	Possible oral/dental impact
Hypertension	Angiotensin-converting enzyme (ACE) inhibitors (e.g., ramipril) Angiotensin II receptor blockers (e.g., valsartan) Calcium channel blockers (e.g., amlodipine) Diuretics (e.g., furosemide)	Dry mouth Lichenoid reaction
Hypercholesterolaemia/hyperlipidaemia	Statins (e.g., atorvastatin)	Interaction with fluconazole (alternative = nystatin 5mg/ml QDS)
COPD	Short-acting beta-2 agonists (e.g., salbutamol inhaler) Long-acting beta-2 agonists (e.g., salmeterol) Steroid inhaler (e.g., beclometasone – Becotide)	Dry mouth Candidal infection
Insulin-dependent diabetes mellitus (T1DM)	Insulin	May predispose to hypoglycaemic episode – peak activity 100-120 minutes post administration (avoid appointments then)
TIA/CVA prevention Maintenance post-bypass graft/valve replacement	Vitamin K antagonists (e.g., warfarin)	See above SDCEP guidelines for extractions. Interactions that may increase INR: 1. Metronidazole (alternative = clarithromycin 500mg BD). 2. Fluconazole (alternative = nystatin 5mg/ml suspension QDS).
	Antiplatelet agents (e.g., aspirin)	Avoid co-administration with NSAIDs (alternative = paracetamol)
Depression	Tricyclic antidepressants (e.g., prothiaden) SSRIs (e.g., fluoxetine)	Dry mouth (increased caries/periodontal risk)
Parkinson's disease	Levodopa/carbidopa	Dry mouth Mouth/throat pain
Chemotherapeutic agents for oral cancer	Cytotoxic agents (e.g., 5-fluorouracil) Platinum-based antineoplastic agents (e.g. cisplatin)	Mucositis/oral ulceration Dry mouth Candidal infection Vomiting
Primary adrenal insufficiency	Corticosteroids (e.g., hydrocortisone)	Risk of adrenal crisis (supplemental corticosteroids before stressful procedures)
Osteoarthritis/rheumatoid arthritis	NSAIDs (e.g., ibuprofen, diclofenac)	
Osteoporosis	Bisphosphonates (e.g., alendronic acid) RANKL-inhibitors (e.g., Denosumab)	MRONJ (see extraction guidelines in Prof. Allen article) ¹⁶

supragingival tooth structure to attempt root canal treatment (RCT), so extraction was decided upon as the only viable course of treatment. Management was as follows:

- risks of postoperative bleeding and MRONJ explained and consent obtained;
- deferral of the morning dose of apixaban (took other medications as normal);
- administration of a loading dose of 2g amoxicillin one hour pre-op, along with 0.2% chlorhexidine mouth rinse;
- extraction and use of Gelatemp haemostatic sponge and one simple interrupted resorbable suture;
- prescription of a one-week supply of amoxicillin 500mg plus chlorhexidine 0.2% mouth rinse postoperatively; and,
- review four weeks later.

Conclusion

In conclusion, it is imperative that the systemic health circumstances of all patients are duly considered in the delivery of dentistry. This is especially important among elderly patients as they are more likely to have existing comorbidities and polypharmacy issues, leaving them at an increased risk for developing oral health-related problems, and impacting on the dentists's ability to deliver adequate dental care (Table 3).

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