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# Systemic Diseases and the Elderly

**Abstract:** Although systemic diseases can occur at any age, they are more common in older patients. Accurate and detailed medical and drug histories are important in dental practice as many conditions and medications can influence oral health and dental care in patients. Not only can these conditions influence patient care in the surgery and oral hygiene at home, but access to dental services may also be adversely affected.

**Clinical Relevance:** The systemic diseases can impact upon oral care or can have oral manifestations. Many of the pharmacological interventions prescribed for chronic conditions can have multiple and diverse adverse effects on the oral environment.

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Within an ageing population specific disease patterns are emerging, with older people more likely to develop several chronic diseases. The impact of these conditions is predicted to grow substantially over the next generation as a result of the increase in life expectancy.<sup>1,2</sup> The most common conditions affecting elderly ambulatory patients are arthritis, cancer, chronic obstructive pulmonary disease, diabetes, cardiovascular disease, mental health conditions, osteoporosis, Parkinson's disease and stroke.<sup>3</sup> The conditions on this list correlate with the leading causes of death in the developed world, as outlined by the WHO,<sup>4</sup> which include cardiovascular diseases, malignant diseases and cerebrovascular diseases.

The relevance of these systemic conditions to dental practitioners is two-fold. First, the conditions themselves can impact upon dental treatment or can have oral manifestations. Secondly, many of the pharmacological interventions prescribed for chronic conditions can have multiple and diverse adverse effects on the oral environment. The medications used in some of these conditions and their oral side-

effects are represented in Table 1 and others are discussed in the text. Many of these medications have significant side-effects on various body organs and tissues. We have confined our discussion to the oral side-effects of these agents. The aim of this article is to outline systemic diseases that have oral manifestations and medications used to treat systemic diseases that impact upon the oral mucosa.

## Arthritis

Osteoarthritis (OA) affects the weight-bearing joints resulting in the degeneration of articular cartilage and subchondral bone. Over 80% of people 75 years or older have clinical signs of OA and more than 80% of people over 50 years of age have radiographic evidence of OA.<sup>5</sup> It can result in pain and limitation of movement, particularly after a period of rest. Management of the condition is aimed at symptomatic relief with non-steroidal anti-inflammatory agents and physiotherapy to help with the stiffness. With disease progression joint replacement of hips or knees may be necessary.

Rheumatoid arthritis (RA) is an inflammatory disease affecting peri-articular tissue and bone. RA affects approximately 1% of the population and is more common in females than in males.<sup>6</sup> It classically manifests as symmetrical polyarthritis and can have multiple extra-articular features. Management of this condition can include analgesics, corticosteroids and



Figure 1. Arthritic changes in the hand.

immunomodulatory agents.<sup>7</sup>

Neither condition commonly has oral manifestations, however, arthritic changes can occur in the temporomandibular joint. Arthritic changes in the hands may result in limited function and therefore reduces the patient's ability to maintain oral hygiene (Figure 1). During dental visits, patients with RA should not be maintained in the supine position owing to the risk of dislocation of the atlanto-axial joint in the neck. With the reduced mobility experienced by patients, domiciliary care may be necessary.

## Cancer

Genito-urinary, gastro-intestinal and lung cancers are the most common malignancies affecting the elderly.<sup>8</sup> Although these conditions do not have a direct effect on the oral cavity, the treatment involved in the management of these malignancies may impact upon the mouth. Some

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Category of drug	Oral side-effects
<b>Arthritis</b> Corticosteroids  Methotrexate NSAIDs	Oral microbial infections Poor wound healing Oral ulceration Haemorrhage Lichenoid mucosal reaction
<b>Chronic obstructive pulmonary disease</b> Corticosteroids	Oral microbial infections Poor wound healing
<b>Diabetes</b> Oral hypoglycaemics	Lichenoid mucosal reaction Taste disturbance
<b>Cardiovascular disease</b> ACE inhibitors  Alpha blockers  Anti-coagulants Beta blockers  Calcium channel blockers  Diuretics  Potassium channel activators Statins	Lichenoid mucosal reaction Oral ulceration Taste disturbance Lichenoid mucosal reaction Salivary dysfunction Haemorrhage Lichenoid mucosal reaction Oral ulceration Salivary dysfunction Gingival enlargement Lichenoid mucosal reaction Salivary dysfunction Taste disturbance Lichenoid mucosal reaction Salivary dysfunction Taste disturbance Oral ulceration Lichenoid mucosal reaction
<b>Parkinson's disease</b> Levodopa	Salivary dysfunction Taste disturbance

**Table 1.** Medications and their oral side-effects.

chemotherapeutic agents can cause oral mucositis and intravenous bisphosphonates, used in the treatment of prostate, bone and breast cancer and multiple myeloma, are associated with bisphosphonate-related osteonecrosis of the jaws (BRONJ) (Figure 2).

Oral mucositis (OM) is a reversible injury in the epithelium and the submucosa, which is characterized by painful erythema, erosions and ulceration of the oral mucosa (Figure 3). It can present with a varying degree of severity and has various clinical manifestations. It is a common complication

of cancer treatment experienced by approximately 80% of patients undergoing head and neck radiotherapy and 40% of patients undergoing chemotherapy.<sup>9</sup> Of patients undergoing haematopoietic stem cell transplants, 30–69% are reported to experience OM.<sup>10</sup> The pain associated with OM can be quite severe, requiring management with opioid analgesia; there can be a reduction in oral intake of nutrition, often an increase in oral infection<sup>11</sup> and, occasionally, the severity of OM may necessitate a temporary cessation in therapy.



**Figure 2.** Bisphosphonate-related osteonecrosis of the jaw.



**Figure 3.** Oral mucositis.

Osteonecrosis is a term used to describe the death of bone cells, including osteocytes and the cells of the bone marrow. It also leads to destruction of bone endothelial cells and vasculature, leading to impairment of blood flow within the bone.<sup>12</sup> Clinically, BRONJ commonly presents as soft tissue swelling and infection, leading to abscess formation both intra- and extra-orally, loose teeth and exposed bone. It may be painful or completely asymptomatic.<sup>13</sup> Prior to the instigation of bisphosphonate therapy a full dental examination should be carried out, invasive dental procedures should be completed and non-restorable teeth with poor prognosis should be extracted. Bisphosphonate therapy can then be commenced 4–6 weeks later, allowing for appropriate bone healing to take place.<sup>14</sup>

### Chronic obstructive pulmonary disease

Chronic obstructive pulmonary disease (COPD) is a term used to represent a number of conditions that result in progressive pulmonary airflow limitation. COPD is a leading cause of morbidity and is projected to rank fifth in 2020 as a worldwide burden of disease.<sup>15</sup> These conditions include

bronchitis, emphysema and chronic asthma.

Although there are no oral manifestations of these diseases, care needs to be taken in the treatment of patients with these conditions. Patients with COPD should be treated in the upright position as they can become breathless when supine. Patients should be advised to bring inhalers with them to their appointments. The use of corticosteroid inhalers can lead to oral fungal infections, therefore patients should be encouraged to rinse their mouth after use.

### Diabetes

Diabetes mellitus (DM) affects over 171 million people worldwide<sup>16</sup> and, in the US alone, an annual incidence of 625,000 people over the age of 65 years is reported.<sup>17</sup> Type II DM is more common in all age groups and can be related to lifestyle, whereas Type I is more common in younger people but can present at any age. Development of the condition in the elderly can present unusually in the form of complications associated with DM, such as cataract or peripheral vascular disease.

The principal risk to the diabetic patient during dental treatment is hypoglycaemia. This risk can be reduced by advising the patient to maintain regular meals and insulin times on the day of the dental appointment and to arrange the appointment time around these events. Diabetic patients are predisposed to oral candidal infections and poorly controlled diabetics can be immunocompromised. Peripheral neuropathies, a complication of DM, can present in the oropharyngeal region leading to deficits in taste and smell and a burning sensation in the mouth.<sup>18</sup> The most pronounced oral change seen in patients with diabetes is more aggressive periodontal disease.<sup>19</sup>

### Cardiovascular disease

Cardiovascular disease increases exponentially between ages 40 and 80.<sup>20</sup> Hypertension, one of the most adjustable risk factors for cardiovascular disease, can be difficult to diagnose in the elderly as blood pressure naturally rises with age. Ischaemic heart disease is a disease of the coronary arteries due to atheroma and is responsible for 70% of all deaths after the age of 75 years.<sup>21</sup> Clinically, the conditions associated

with ischaemic heart disease are angina pectoris, myocardial infarction and sudden death. With regard to the oral manifestations of these conditions, patients with angina and myocardial infarction can experience referred pain to the head and neck, including the mandible.

The treatment of patients with cardiovascular disease in a dental setting has seen a major change in the last year with the publication of the NICE guideline on antibiotic prophylaxis against infective endocarditis.<sup>22</sup> These guidelines state that the provision of pre-operative antibiotic prophylaxis against infective endocarditis is no longer necessary for any patient undergoing dental treatment, regardless of his/her cardiac condition.

### Mental health conditions

The likelihood of developing mental health conditions such as dementia, the progressive and irreversible impairment of cognitive function, increases with age.<sup>23</sup> Dementia affects up to 9.4% of those over the age of 65 years<sup>24</sup> and approximately 20% over the age of 80.<sup>25</sup> The most common cause of dementia is Alzheimer's, which is a primary degenerative cerebral disease of unknown aetiology. It is characterized by progressive decline in memory and concentration, and decreased comprehension, attention and judgement.<sup>26</sup> As with many of the other systemic diseases mentioned in this article, there are no specific oral manifestations of Alzheimer's, however, owing to the impaired cognitive function, patients are frequently unable to maintain oral hygiene.<sup>26</sup> This results in increased susceptibility to dental disease.

### Osteoporosis

Osteoporosis is a condition in which there is a loss of bone mass. It is inversely linked to oestrogen levels and therefore is more prevalent in post menopausal women. It is estimated that over 200 million people worldwide have osteoporosis.<sup>27</sup> Although the oral manifestations of osteoporosis are now rare, it can affect the mandible and the maxilla, leading to increased risk of fracture with extraction. In addition to the possibility of oral involvement in this condition, the prolonged use of corticosteroids in the management of some oral mucosal conditions can also lead to the complication of osteoporosis.

Oral bisphosphonates are used in the management of osteoporosis.<sup>28,29</sup> The risk of developing BRONJ with these agents is much lower than previously outlined with intravenous therapy owing to the relative bioavailability of the medication. At least 50% of intravenous bisphosphonates is bioavailable for incorporation into bone, compared with an average of 1% absorbed via the gastro-intestinal tract with oral bisphosphonates.<sup>30</sup> According to the American Dental Association Council on Scientific Affairs, elective dental treatment is not contra-indicated in patients taking oral bisphosphonates.<sup>31</sup> Patient education regarding the relatively low risks of BRONJ associated with oral bisphosphonates, the importance of maintaining optimal oral health, and the need to attend their dental practitioner if oral symptoms develop are critical.

### Parkinson's disease

Parkinson's disease is a condition caused by denervation of the dopaminergic pigmented neurones in the basal ganglia, with a variable prevalence of up to 1.5% in people over the age of 60 years reported in Europe.<sup>32</sup> It is characterized by a trio of signs – tremor, bradykinesia and rigidity. An early sign of the condition can be hypersalivation<sup>33</sup> leading to drooling of saliva and progression of the disease can lead to dysphagia in up to 80% of patients.<sup>34</sup> In the later stages of the condition the excess saliva, difficulty swallowing and the flexed neck position associated with the rigidity can result in difficulty with dental treatment. Dopaminergic agonists are commonly used as early monotherapy and also used as an adjunct to Levodopa in the management of Parkinson's disease.<sup>35</sup>

### Stroke

Stroke is characterized by the acute onset of neurological dysfunction with symptoms that persist after 24 hours. Approximately 150,000 people have a stroke annually in the UK and it is more common over 65 years.<sup>36</sup> The resultant hemiparesis can lead to limited mobility and communication difficulties.<sup>37</sup>

The oral consequences of these cerebrovascular accidents are long lasting oral sensory and motor deficits, resulting in loss of the gag reflex, poor tongue function

and lip seal, difficulty eating and drinking, inability to maintain dental hygiene and impaired use of dentures.<sup>38</sup> No elective dental treatment should be carried out in the three months following a cerebrovascular accident and dentists may recommend the use of an electric toothbrush to compensate for limited dexterity in some cases.

Following a stroke, patients receive anti-coagulant therapy to prevent further cerebrovascular accidents. Warfarin is the most common anti-coagulant used as part of this preventive regime. Careful monitoring of the INR is required before dental treatment is carried out, with the current recommendation of an INR less than 4.0 for minor dental procedures, including extractions, as recommended in the BNF.<sup>39</sup> Caution is also needed when prescribing any medications for these patients as numerous potential drug interactions can occur with Warfarin, resulting in either potentiation or inhibition of the drug.

In conclusion, aside from the impact systemic diseases and their treatments have on the general wellbeing of patients, these conditions and medications can impact upon the oral environment and hence the provision of oral care in the elderly. Dental practitioners need to be familiar with the potential influences of systemic diseases and also with the potential for side-effects and interactions associated with a wide range of medications.

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