Dental practice implications of systemic diseases affecting the elderly: a literature review

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Abstract
According to the 2000 Brazilian Census, elderly people are over 14 million habitants. In consonance with what occurs worldwide, the Brazilian population is growing older and the elderly are expected to be over 33 million by the year of 2025. Although geriatric dentistry has already been recognized as a dental specialty, there is a lack of specialists in this branch of dentistry, which means that general dentists and other dental specialists will be dealing more and more with these patients. Aged individuals are commonly affected by a number of systemic diseases that have an impact on their oral health, such as cardiovascular and cerebrovascular diseases, diabetes mellitus, oral cancer, osteoporosis, Alzheimer’s and Parkinson’s diseases. Dental professionals must be prepared to treat properly these special patients. Therefore, the aim of this review article is to instruct dentist about these highly prevalent diseases affecting the elderly, as well as discuss their oral manifestations and dental implications, in order to propose a safe and adequate oral health care for these patients. Here we will shortly describe the diseases’ etiology, main signs/symptoms and medical treatment and will discuss about how to proceed with dental treatment in patients suffering from these pathological conditions.

Key words: elderly, systemic diseases, oral care.

Introduction
The World Health Organization (WHO) defines older adults in developed countries as those people aged 65 years or over. In developing countries, like Brazil, the elderly population is considered to be over the age of 60 years. According to the Brazilian Census data for 2000, the Brazilian elderly population consists of around 14.5 million people (8.6% of total population), of which around 7.2 million (49.6%) were disabled elderly with at least one mental, physical, sight or hearing disability. By 2025, it is estimated that this number will practically double, reaching about 33.2 million.

Many of the elderly patients have a variety of systemic diseases that will have an impact on their oral health. In order to provide good oral health care, dental professionals must understand the complexities inherent to older people, their special needs and their capacity to undergo and respond to care.

As in general health care, prevention is a key factor in the dental care of aged people. Therefore, the most important considerations for dental professionals are how well the patient is compensated for his/her medical condition and the exact dental intervention that will be performed. Noninvasive procedures in patients with minimal incapacity carry less risk than do surgical procedures in ill people. In addition, local anesthesia should be used whenever possible to control pain and anxiety, provided it is administrated according to the recommended epinephrine dosage (maximum of two anesthetic cartridges).

Although geriatric dentistry has recently been recognized as a new dental specialty, it is well known that we still lack this type of specialists in Brazil, which means that, both general dentists and other dental specialists must be prepared to deal with elderly patients and their specific needs. Dentists should work closely with the rest of the health care team and be prepared to manage emergencies that more commonly occur in older people. In this article, we will review some of the systemic diseases that commonly affect aged adults and the management modifications needed for providing adequate oral health care in functionally independent older adults. Special descriptions about these diseases are available elsewhere.
Cardiovascular and cerebrovascular diseases
According to the WHO, in 2003, cardiovascular diseases caused a total of 16.7 million deaths. Of these, 7.2 million corresponded to ischemic heart disease, 5.5 million to cerebrovascular accidents and 3.9 million to other cardiovascular disorders, fundamentally associated to arterial hypertension11.

The present study describes two of the most frequent cardiovascular disorders - ischemic disease and heart failure - and stroke. In spite of being a cerebrovascular disorder or cerebrovascular accident (CVA), stroke occurs most frequently in patients with existing cardiovascular disease, especially hypertension. Because high blood pressure is one of the most modifiable risk factors for cardiovascular and cerebrovascular diseases, specific considerations for dental treatment of high blood pressure patients will also be presented.

Ischemic heart disease occurs as a result of reduced coronary blood flow causing myocardial ischemia. The triggering stimuli for this condition include emotional distress, intense physical exercise, underlying disease or surgical intervention12. The cardiovascular risk factors in the general population have been well known for decades. Smoking, arterial hypertension, hyperlipidemia, diabetes mellitus, age, the male gender and genetic factors have all been implicated13.

The goal of in-hospital treatment is to ensure immediate myocardial reperfusion, based on pharmacological or surgical means. Aspirin is the most common drug of choice, due to its antiplatelet action, and heparin. Other drugs used for the treatment and secondary prevention of acute myocardial infarction comprise beta-blockers, calcium antagonists and angiotensin converting enzyme inhibitors (ACEIs)14.

Stable angina is characterized by pain on the same site and is similar to the pain in ischemic heart disease, though of lesser duration. It subsides with rest and/or with the administration of sublingual nitroglycerin. Unstable angina manifests at rest, the pain is typically of longer duration and is more intense and less responsive to nitrates. Patients with a history of chest pain receive treatment in the form of antiplatelet drugs, nitrates, beta-blockers and calcium antagonists15.

Heart failure comprises the global clinical manifestations associated with ventricular dysfunction, heart valve defects or ventricle loading conditions. In order words, the heart becomes unable to supply the required blood flow in relation to the existent venous return flow and the tissue and organs needs. It can either be acute, as a result of exposure to cardiotoxic drugs or secondary to coronary occlusion or be chronic and associated to patient history of arterial hypertension and ischemic heart disease16.

Surgical management is based on heart transplantation, valve replacement or repair. The pharmacological treatment is focused on neurohormonal block with ACEIs (captopril, enalapril, lisinopril) and betablockers (atenolol, bisoprolol, propanolol), aldosterone antagonists (spironolactone) and angiotensin receptor antagonists17.

CVA or stroke results from sudden interruption of blood flow to the brain, causing oxygen deprivation. It occurs when an artery bursts (hemorrhage) or becomes clogged cutting off the vital oxygen supply. The brain tissue deprived of oxygen dies within min. The survival rate and severity of the ensuing functional deficit depend on the type of stroke and damage extent18.

Older patients with previous history of transient ischemic attack or a full-blown cerebrovascular accident, high blood pressure, hyperlipidemia, smokers, affected by diabetes, overweight and with family history of stroke are at higher risk of developing a first or recurrent cerebrovascular accident19.

Patients with stroke are frequently treated with oral anticoagulants, such as warfarin sodium (antivitamin K). However, in these cases, the treatment should begin within 3 h of symptom onset for its benefits to be achieved20. For hemorrhagic stroke, immediate surgery is crucial to prevent rebleeding, which results in serious impairment or death in 40% to 60% of cases21.

Cardiovascular and cerebrovascular diseases - considerations for dental practice
All the aforementioned pathological conditions must be taken into account by the dentist at the time of treatment. When treating geriatric patients with heart diseases, the dentist and all staff members must be aware of the emergency protocol procedures. In general, patients with heart disease must be told to take their medications as usual on the day of the dental procedure, and the dentist should keep on the patients’ records all medications in use as well as update this information on each and every appointment.

In patients with cardiovascular disease it is advisable to minimize the stress of visiting the dentist as well as to provide an effective analgesic condition for treatment. The controversy as to whether or not to use a vasoconstrictor (adrenalin or levonordrephrine) with the local anesthetic solution is due to the vasoconstrictor’s effect on arterial pressure.

The use of beta-blockers as antiarrhythmic and antihypertensive medication is common in patients with heart disease. Therefore, it must be taken into account that these medicines can delay peripheral plasma clearance of the local anesthetic, and that the prolonged use of nonsteroidal anti-inflammatory drugs (NSAIDs), commonly occurring in elderly people, can reduce the antihypertensive effects. Additionally, a visit to the dentist itself generates anxiety and provokes the release of endogenous catecholamines in amounts that may exceed those administered with the local anesthetic solution. The association of a vasoconstrictor should thus be limited, taking care not to exceed 0.04 mg of adrenalin (i.e., 2
anesthetic cartridges containing 1.8 mL of anesthetic with adrenalin 1:100,000\textsuperscript{22}.

Patients with stable ischemic heart disease receiving atraumatic treatment under local anesthesia can be treated in the dental office. Prophylactic administration of 0.3 to 0.6 mg of nitroglycerine may be indicated if the patient has angina more than once a week. The dentist should consult the patient’s physician before providing dental care for patients with unstable angina or to those with history of a recent myocardial infarction, angioplasty or stent placement\textsuperscript{23}. During the first 6 months after an ischemic episode, dental treatment should be limited to emergency situations aimed at providing pain relief\textsuperscript{24}. Pharmacologically, the use of antiplatelet drugs (aspirin, clopidogrel, ticlopidine, dipyridamole), anticoagulants (antivitamin K or the coumarins) and beta-blockers (mentioned above) deserves special attention. If discontinuation of thrombolytic medication is required, the decision to provide dental treatment must be taken in coordination with the physician supervising the patient medication\textsuperscript{25}. When the antiplatelet medication cannot be interrupted at the time of an invasive dental treatment and a risk of bleeding is anticipated, local hemostatic measures must be applied such as sutures, platelet-rich plasma, electric or laser scalpel\textsuperscript{26}.

Regarding hypertension, it is particularly important to avoid anxiety and pain in such patients and, ideally, the blood pressure should be controlled before the dentist begins elective dental treatment. If the patient has a persistent hypertension, the dentist should seek the opinion of the patient’s physician before initiating the dental treatment. In these patients, continuous or periodic blood pressure monitoring is recommended. By the end of the dental session, aged patients under antihypertensive drugs may suffer with orthostatic hypotension, and so the dentist should elevate the back of the dental chair to the upright position slowly and in stages. If the patient’s blood pressure rises, the dentist should discontinue the dental treatment, place the patient in a supine position, should allow the patient to rest and recheck the blood pressure after 5 min. If at that point the blood pressure is consistently high, the dentist should call for emergency medical help\textsuperscript{27}.

Finally, another factor that must be considered is the risk for infective endocarditis (IE). According to the American Heart Association revised guidelines for IE, individuals considered at the highest risk for adverse outcome from endocarditis and to whom antimicrobial prophylaxis is advised are those with prosthetic cardiac valve or prosthetic material used for cardiac valve repair, previous IE, congenital heart disease and cardiac transplantation recipients who develop cardiac valvulopathy. A number of other cardiac conditions may pose mild to moderate risk for endocarditis. Reading the American Heart Association guidelines for IE is strongly recommended\textsuperscript{28}. When treating patients who have undergone a CVA episode, the dentist must pay attention to the possible complications that these patients might present. It is recommended that the first post-stroke dental appointment is scheduled only six months after the CVA episode. At the time of the dental visit, collecting information from the patient, the patient’s physician, family members and caregiver will help determining his/her physical and mental status\textsuperscript{29}. Patients with stroke are frequently treated with oral anticoagulants, such as warfarin sodium (antivitamin K), and the dentist must consult the patient’s physician about the need of altering the drug regimen before undergoing invasive therapies. In order to prevent a subsequent stroke, the dentist must treat active infections aggressively, since even a minor infection may alter blood coagulation, trigger thrombus formation and cause cerebral infarction. Dysphasia may be present in patients with stroke and can cause changes in diet, mastication, nutrition and body weight. Inability to completely clear the mouth of food particles may result in halitosis, caries and increased risk of infection. The patient must be advised about the importance of maintaining a good oral hygiene. Weakness of the facial area or paralysis of extremities may impair oral hygiene procedures and the dental health care provider may need to modify oral hygiene instruments for ease of use. A consultation with an occupational therapist would be helpful. Most cases of infective endocarditis involving oral microorganisms are probably caused by pathologies of dental origin, mastication and oral hygiene procedures. The dentist may initiate a long-term regimen of chlorhexidine mouthrinses to aid in plaque control. The gag reflex may be diminished after a CVA as well, which require particular attention during the dental treatment. The patient’s head position can be adjusted if needed, while thorough and constant evacuation will help prevent aspiration of foreign matter\textsuperscript{30,31}.

### Diabetes Mellitus

An estimated 10 million people are living with diabetes in Brazil. Of that, people aged 30 to 69 and over 69 years old correspond to 3.3\% and 21.7\% of the diabetic population, respectively\textsuperscript{32}. Data from a 20-year national study indicated a 7.6\% prevalence in the Brazilian population\textsuperscript{33}.

This clearly shows that modifications in environmental factors and lifestyle of the Brazilian people in the last two decades, such as sedentary living and obesity, have up regulated the prevalence rates of diabetes in Brazil, which tends to keep increasing as the population grows older. Therefore, it is reasonable to predict that dentists will be treating more patients with this disease.

Diabetes mellitus is a syndrome of abnormal carbohydrate, fat and protein metabolism that results in acute and chronic complications due to the absolute or relative lack of insulin. There are mainly two general categories of diabetes: type 1, which results from an absolute insulin deficiency, and
Type 2, which is the result of insulin resistance and/or an insulin secretory defect. They both have a set of systemic and oral signs and symptoms. Oral hypoglycemic and insulin comprise the main form pharmacological control of the disease. Oral hypoglycemic agents include sulfonylureas, biguanides, alpha-glucosidase inhibitors and thiazolidinediones. Insulin is available in short-acting (1 to 1h), regular-acting (4 to 6h), intermediate-acting (8 to 12h) and long-acting (24-36h) formulations. Diet and physical exercise are a necessary component of the therapy for patients with both type 1 and type 2 diabetes. Because diabetes has also oral manifestations, dental professionals can play an important role in diagnosing and managing patients with diabetes. These clinical signs include gingivitis and periodontitis, which are associated with poorly controlled diabetes and contribute to problems with glucose control, increased risk of developing new and recurrent carious lesions, xerostomia, oral mucosal disorders (e.g.: lichen planus and recurrent aphthous stomatitis) and opportunistic infections (e.g.: oral candidiasis and taste disorders).

Diabetes Mellitus – considerations for dental practice

Two critical steps are involved in treating patients with diabetes: the diagnosis and the level of disease control. Therefore, contact with the patient’s physician is imperative and medical updates must be recorded in the patient’s files at each visit to guide the dental treatment decisions. It is recommendable that the dentist knows how to use a glucometer to measure blood glucose levels rapidly from the patient’s fingertip. It is also important to have a dental office properly equipped with immediate sources of glucose in case a diabetic-induced hypoglycemic event occurs. A hypoglycemic event may occur from disruption of the normal pattern of food intake. Prevention of such an event can be achieved by the administration of oral glucose just before the dental appointment if the patient has taken his/her medication but has not had the appropriate meal. Medications used by dental professionals may require adjustment for diabetes-associated therapies. For example, large amounts of epinephrine can antagonize the effects of insulin and result in hyperglycemia. Small amounts of systemic corticosteroids can severely worsen glycemic control. Patients taking oral hypoglycemic agents who are placed on steroid therapy may require short-term insulin therapy to maintain glycemic control. Alternatively, aspirin, sulfa antibiotics and antidepressants can promote hypoglycemia.

Patients with poorly controlled diabetes are at risk of developing oral complications because of their susceptibility to infection and sequelae, and will likely require supplementary antibiotic therapy. The dentist should avoid administering tetracyclines, aspirin and corticosteroids because these drugs can disturb diabetic control. However, amoxicillin and acetaminophen, alone or combined with codeine, can be used safely. The dentist should manage infections aggressively because patients with diabetes may be immunosuppressed individuals. People with well-controlled diabetes usually can tolerate well routine dental procedures, even a single-tooth extraction under local anesthesia.

People who are insulin-dependent can undergo minor surgical procedures within 2 h of eating breakfast and receiving their morning insulin injection, with no change needed in the insulin regimen. Dentists should refer to an oral surgeon for any patient who has poorly controlled diabetes or who needs invasive procedures such as multiple extractions. Managing patients with diabetes does require more rigorous follow-up, more aggressive interventional therapy rather than observation, regular communication with physicians and greater attention to prevention. Therefore, these patients require more frequent recall visits and great attention to acute oral infections.

Oral cancer

Cancer may be defined as an uncontrolled tissue growth in susceptible patients, which results from an imbalance between cell division and apoptosis. In Brazil, as well as worldwide, squamous cell carcinoma (SCC) is the major type of oral cancer and it is estimated that approximately 17 men and 5 women in every 100,000 people will be affected by oral cancer. Males in their 50’s or older and with low socioeconomic level have the typical profile of head and neck SCC patients in Brazil. Even in developed countries, head and neck SCC patients present poor dental condition. Elderly people in Brazil usually have poor oral hygiene, advanced periodontal disease and severe dental caries. SCC typically presents as a persistent mass, nodule or an indurated ulcer. Color changes are common and consist of red or red and white hues. Involvement of adjacent tissues is possible, though not necessary, and represents local invasion of the tumor. Symptoms are uncommon in earlier stages of the disease but become frequent with advanced local invasion. Metastatic dissemination occurs through the submandibular, cervical and jugular lymphatic pathways and distant metastases most commonly spread to the lungs. Typically, one or a combination of the three principal therapeutic modalities treats head and neck cancer: surgery, radiotherapy and chemotherapy. The use of one treatment over another depends on the size, location and stage of the primary tumor, the patient’s ability to tolerate treatment, and the patient’s desires.

Oral cancer – considerations for dental practice

In order to provide timely and competent care, oral healthcare providers must understand the disease, its treatment and the impact that the disease and/or its treatment may have on these patients. Because the essence of malignancy escapes full understanding, prevention must be equated with early detection. The general dentist is clearly
responsible for early detection of tumors in the head and neck area, especially oral soft tissue lesions. Proper diagnostic procedures must be implemented in the evaluation of any lesion that do not respond to usual therapy within 7 to 14 days and when a malignancy is suspected\(^{46}\). Previous publications have recommended a dental care plan specifically for patients undergoing cancer therapy. In the following paragraphs, we tried to summarize the most important issues regarding cancer therapy, divided into three stages: before, during and after therapy.

**Before therapy.** Before cancer therapy, the patient should have meticulous oral hygiene and the dentist should institute preventive dental care. The dentist should treat restorable teeth and extract severely damaged hopeless teeth in the radiation path. To minimize the risk of osteoradionecrosis, an interval of at least two weeks between extraction and the start of head and neck radiotherapy is ideal\(^{46}\).

**During therapy.**
During cancer therapy, the dentist should avoid performing invasive dental procedures whenever possible. During radiotherapy to the head and neck, mucosal and salivary gland protection with amifostine can minimize the mucositis and xerostomia that often result. During chemotherapy, it may be possible to reduce mucositis if the patient drinks ice-cold water or sucks ice during infusion of the agent. Oral ulceration caused by methotrexate can be reduced using systemic or topical folinic acid (leucovorin calcium). Mucositis may be relieved by means of warm normal saline mouthwashes and benzamidine oral rinses, or lignocaine (lidocaine) viscous 2 percent, and by maintaining good oral hygiene with twice-daily with 0.12 percent alcohol-free chlorhexidine mouthrinses. A saliva substitute may provide some symptomatic relief from xerostomia, as may salivary stimulants such as pilocarpine or cevimeline\(^{42}\).

Prophylactic use of topical antifungal drugs (such as a nystatin suspension mouthrinse), used four times daily, may help ameliorate varicella or zoster infections. Some patients’ compliance with the medication regimen. To reduce candidal carriage, patients undergoing cancer therapy should clean and soak dentures carefully in 1 percent hypochlorite for up to 30 min/day to reduce bleaching\(^{42}\).

Prophylactic acyclovir has lowered the post-chemotherapy incidence of herpes simplex and zoster infections and mortality from zoster. The dentist should treat oral herpetic infections with acyclovir suspension or systemic acyclovir or valacyclovir (tablets or infusion). Zoster immune globulin may help ameliorate varicella or zoster infections\(^{44}\). If tooth extractions are unavoidable, trauma should be kept to a minimum, the socket should be sutured carefully and prophylactic postoperative antibiotics may be needed.

**After therapy.** Oral hygiene and preventive dental care should be continued. Dryness of the mouth can be managed with salivary supplements or sialogogues\(^{42}\). Radiation caries and dental hypersensitivity can be controlled with a noncariogenic diet and with daily application of a neutral sodium fluoride by means of custom-fabricated carriers. If tooth extractions are unavoidable, the dentist should minimize the trauma as much as possible, using atraumatic techniques, suturing carefully and providing prophylactic antibiotics. If dentures are required, they should be fitted after the mucositis subsides and salivary flow has improved\(^{46}\). Although the dentist may not be able to provide definitive restorative care to patients receiving palliative therapy, they must keep these patients free of active carries disease and dental pain. Glass ionomers may be useful in restorations, as they release fluoride\(^{46}\).

**Osteoporosis.**
Osteoporosis and osteopenia are defined by low bone mass, deteriorating bone architecture and bone fragility. It results from an imbalance in the rates of bone formation and resorption that cause bones to lose mineral mass. Along with the loss of minerals, they also lose strength and the ability to withstand low-level trauma. The consequences of fracture in elderly people include increased risk of death, long-term nursing home care or permanent limitations in mobility and performance of daily living activities\(^{49}\). Although osteoporosis can affect people of all ages, they occur most often in middle-aged and elderly people. According to the National Institute of Traumatology and Orthopedics of Brazil, 1 out of 5 men and 1 out of 3 women over the age of 50 are affected by some degree of this disorder\(^{47}\). Women are greatly affected by osteoporosis since they experience a decline in estrogen levels at menopause. Bone loss is most rapid in early menopause, followed by a slowing 8 to 10 years after the last menstrual period\(^{48}\).

Calcium and vitamin D are key nutrients for bone health, and vitamin and mineral supplementation are important components of any osteoporosis treatment or prevention plan\(^{48}\). Hormone replacement therapy initiated at the onset of menopause and continued indefinitely preserves and, to a modest extent, augments bone mineral density by increasing osteoblastic activity. Concomitant with hormone replacement therapy, calcium and vitamin D intake, physicians are also likely to prescribe load-bearing exercise and avoidance of smoking, alcohol consumption and other deleterious habits\(^{48}\).

**Osteoporosis – considerations for dental practice**
The main consideration to be made about patients with osteoporosis is that they might be at higher risk for periodontal disease. Bone loss is a feature shared between conditions. Furthermore, oral osteopenia and systemic osteopenia share risk factors, including age, estrogen deficiency and smoking\(^{49,51}\).

Although significant advances have been made in determining the relationship between periodontal disease
and osteoporosis, little research has been done in elucidating this association and there still is a great need for a better understanding of the relationship. One issue encountered with this relationship is the fact that periodontal disease is diagnosed largely in males whereas osteoporosis is a disorder predominantly diagnosed in females. Either way, dentists should put an effort on acting preventively in patients with osteoporosis in order to provide and maintain good oral health conditions. Dental professionals can also play a role in osteoporosis prevention by reinforcing to their patients that a healthy lifestyle has multiple benefits to the body. A healthy lifestyle includes physical activity, avoiding smoking, maintaining a healthy weight and making sure that dietary intakes, especially those of calcium and vitamin D, meet recommendations.

**Alzheimer’s Disease**

Alzheimer’s disease (AD) is a progressive and fatal neurodegenerative disorder characterized by the loss of intellectual functions, including memory, language, visuospatial skills, problem-solving ability and abstract reasoning, as well as by the frequent occurrence of behavioral abnormalities. The disorder is seen most commonly after age 60 years and people with AD lose their ability to care for themselves and, ultimately, causes loss of motor function, leading to immobility, inanition and death.

The etiology of AD is known only partially at this time. Histopathologic examination demonstrates soluble oligomers of β-amyloid, extracellular β-amyloid plaques and intracellular neurofibrillary tangles mainly in those areas that are related to memory, learning, language and emotional behaviors. These deposits presumably disrupt synaptic function and eventually lead to neuronal death. Neurons that use acetylcholine as a neurotransmitter appear to be particularly affected, but neurons that use serotonin, dopamine and norepinephrine also are affected adversely, but to a lesser degree. The synaptic dysfunction and death of cholinergic nerve cells responsible for the storage and processing of information may lead to the memory decline seen in AD. The synaptic dysfunction and death of nerve cells that use serotonin and dopamine are believed to be responsible for the behavioral and psychiatric symptoms seen in patients with AD.

Cholinesterase inhibitors and memantine often are prescribed to improve cognitive performance temporarily, delay the loss of activities of daily living (ADL) and ameliorate behavioral symptoms. Some clinicians add vitamin E (α-tocopherol) to this regimen. Caretakers also invoke non-pharmacological interventions to manage emerging behavioral signs of the disorder. If these interventions are inadequate, the patient’s physician prescribes antipsychotics, mood stabilizers or antidepressants to control the behaviors.

**Alzheimer’s Disease – considerations for dental practice**

People with AD are likely to have a unique set of factors that lead to the development of advanced oral diseases. Impaired cognition, apathy and apraxia in the middle stages of the disorder are responsible for a disinterest in and an inability to perform appropriate oral and prosthetics hygiene techniques. Concomitant hyposalivation (limited to the submandibular gland and of unproven cause) in unmedicated people with AD, as well as the xerostomia induced by many of the medications used to treat AD and other medical problems encountered in the elderly, is marked. This paucity of saliva leads to reduced lubrication; reduced antibacterial, antiviral and antifungal activity; loss of buffering capacity; reduced flushing of plaque and bacteria from dental and oral mucosal surfaces; and interference with normal remineralization of teeth, resulting in the increased prevalence of dry and chapped lips, plaque, gingival bleeding, calculus, periodontal disease and coronal and cervical caries in this patient population. In addition, the care of patients with AD is a challenge because these patients are at risk of developing worsening cognition and behavioral complications. The antimicrobial drugs erythromycin and ketoconazole may decrease the metabolism of donepezil and galantamine. Prolonged administration of these agents may result in central or peripheral hypercholinergic effects. Therefore, it is prudent to consult with the patient’s physician before initiating therapy with these medications.

Dentists should know that adverse drug interactions may occur between medications used in dentistry and cholinesterase inhibitors used to treat AD. Diphenhydramine and amitriptyline (often used to treat chronic facial pain) have anticholinergic properties and, when prescribed for prolonged periods, may antagonize the effects of the cholinesterase inhibitors and place the patient at risk of developing worsening cognition and behavioral complications. The antimicrobial drugs erythromycin and ketoconazole may decrease the metabolism of donepezil and galantamine. Prolonged administration of these agents may result in central or peripheral hypercholinergic effects. Therefore, it is prudent to consult with the patient’s physician before initiating therapy with these medications.

Dentists should complete restoration of oral health function as early as possible in the AD process because the patient’s ability to cooperate diminishes as cognitive function declines. Scheduled appointments should be of short duration (no more than 45 min), and morning appointments usually are best. Before the dentist begins treatment, the caregiver should assist the patient in emptying his or her bladder.

In a review article, Friedlander et al. described in detail all information needed to provide AD patients with safe and efficient treatment. Here we present a summary of what is most important when treating patients in different stages of the disease.

At the earlier stages of the disease, most restorative and rehabilitative dental care can be provided with minimal modification in technique. It is of paramount importance...
that dentists and team members educate the patient’s
caregiver about techniques that can prevent diseases of
dental origin, including oral and written instructions on
proper toothbrushing and flossing methods and on how to
apply chlorhexidine gluconate to the patient’s teeth with
a toothbrush or sponge applicator. Dentists also should
prescribe artificial salivary products for patients with signs
of xerostomia. They should conduct a clinical examination,
provide an oral prophylaxis and apply a brush-on fluoride
gel (with a concentration of at least 1.0 percent fluoride)
at follow-up visits scheduled on a three-month basis.
Clinicians also should treat defects in the natural dentition
or in prostheses at these recall visits.

In middle stages of AD, when the patient is relatively
healthy physically but has lost cognitive skills, treatment
consists of eliminating any sources of potential pain or
infection. Because of the difficulty these patients have in
adapting to new appliances, it is preferable to maintain
old prosthetic devices through relining and repair than to
fabricate new ones. Short-acting benzodiazepines may
enhance dental treatment and, if the patient already is
being treated with an anxiolytic agent, the dental
appointment should be synchronized with the regularly
scheduled dosage interval for maximum benefit (that is,
the appointment should begin 45 min after the patient
takes the medication). Profound local anesthesia is
mandatory to perform dental procedures in these often
anxious patients.

In the late stages of AD, dentists can best diagnose and treat
these acute problems in the dental office using intravenous
sedation administered by trained anesthesiologists or by
having general anesthetic administered in the operating room
of a surgical center or hospital. Some intravenous medications
also are associated with orthostatic hypotension; thus, it is
best to raise the back of the chair slowly after completing
treatment and permit the patient to sit upright for about 5
min before leaving the chair.

Parkinson’s Disease
Parkinson’s disease (PD) is a chronic, progressive,
neurodegenerative disease with a multifactorial etiology.
Characterized by hallmark signs of bradykinesia, rigidity,
tremor and postural instability, it is superseded only by
Alzheimer’s disease as the most common neurodegenerative
disorder
.

The prevalence of PD increases with age, there has been a
growing concern among health professionals since the
number of cases of PD tends to increase as a result of the
longer life expectancy in many populations.

The pathologic hallmark of PD is degeneration of
dopaminergic neurons in the substantia nigra pars compacta
(SNC), resulting in depletion of striatal dopamine
. This
neurotransmitter regulates excitatory and inhibitory outflow
of the basal ganglia
. The neurodegenerative process in
PD is not limited to the SNC, and neuronal loss with Lewy
body formation also occurs in other brain regions which
may account for both motor and nonmotor features of the
disease
.

The most important goals of management are thus to
preserve functional independence and health-related quality
of life (HRQOL). Toward this end, the most effective
treatment for motor symptoms is levodopa, which has been
associated with an increased risk of motor symptoms
fluctuations. Because of that, dopamine agonists are
considered the first line by many clinicians in young-onset
PD. In contrast to very early treatment of symptoms, other
clinicians prefer to delay the dopaminergic therapy for PD
until clinically significant disability or functional
impairment occurs. In these mildly affected patients,
nondopaminergic therapy, such as amantadine, monoamine
oxidase type B (MAO-B) and catechol-O-methyltransferase
(COMT) inhibitors, is an option
.

Whether an early or later treatment approach is adopted,
maintaining functionality for as long as possible is the
goal of clinical management. This not only improves
HRQOL of the patient but also reduces direct costs
associated with the need for office visits and lessens indirect
costs by mitigating dependence on caregivers and allowing
less time off from work.

Parkinson’s Disease – considerations for dental practice
To maintain HRQOL of the elderly, it is important to
develop and retain good oral health
. PD patients may
experience increased difficulties in oral health practices
due to its resting tremor, bradykinesia, akinesia, restricted
mobility and postural instability.

Medications for neurodegenerative diseases can produce
xerostomia in the same way as mentioned for Alzheimer’s
disease and so reduce oral salivary flow and its role in
caries prevention
. Swallowing dysfunction in PD patients
could be also related to oral health through associated
changes in salivary retention. The leading cause of death
among PD patients was reported to be pneumonia
which
could have been aggravated by having aspirated oral
contents remaining due to poor oral health. Recognition
of these factors in the dental management of individuals
with PD is a multifaceted challenge involving areas of
preventive, restorative and prosthetic dentistry
.

Special care must be taken during treatment, once the
movements, drooling and spasmodic head positioning
associated with the disease may compromise the dentist’s
ability to carry out restorative care. These patients’
involuntary movements can make the use of sharp and
rotating instruments hazardous.
Final Considerations

Elderly people can be affected by a large number of diseases, which sometimes manifest simultaneously. This article aimed to present some of the most prevalent diseases affecting these special patients as well as the dental implications that may arise from their systemic conditions. Being aware of these implications, dentists should be able to treat their aged patients properly and avoid exposing them to additional health hazards. However, there still a lack specialists in geriatric dentistry, especially in Brazil. General dentists must hence be prepared to provide the best oral health care possible to this population, and making a warning to this issue was the main goal of the authors with this review.

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