Aging, Systemic Disease and Oral Health: Implications for Women Worldwide (Part II)

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Conflict of Interest Disclosure Statement

- Ms. Goldie reports no conflicts of interest associated with this course.
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Short Description – Aging, Systemic Disease and Oral Health

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Course Contents

Overview

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This is Part 2 of a 2-part series on women, aging and oral health. Part I is available *here*.

Learning Objectives

Upon completion of this course, the dental professional should be able to:

- Identify three women's health concerns observed worldwide.
- Discuss prevalence, risk factors, common treatment and prevention strategies and oral connections for each disease.
- Outline home care strategies to help patients with these diseases improve oral hygiene.

Introduction

Aging, Systemic Disease and Oral Health: Implications for Women Worldwide (Part II) highlights research related to women and stroke, rheumatoid, depression, and the COVID-19 pandemic and its affect on women in these areas. Women have shown disproportionate outcomes from medical conditions in measures of prevention, diagnosis, prevalence, incidence as well as response to treatments. Their culture, education, and, most importantly, access to care have placed female populations worldwide at potential risk for adverse disease outcomes. Knowledge of a condition's symptoms, risk factors, and prevention approaches can assist the oral health care professional in being more informed. From preventive care to treatment strategies and options, medications and resources, the oral health care professional is challenged to stay informed as women's medical needs during the life cycle, and especially during their adult years, are continually changing.

Demographic Trends

In 1900, people over 65 accounted for approximately 4% of the United States population, less than one in twenty-five. In 2019, more than 119 years later, this portion of the population grew to almost 47.8 million or 14.9% of the American population.[1] By the year 2060, when the baby boom generation reaches senior status, more than 98.2 million Americans will be 65 and over, comprising between 25% of the total population (Figure 1).[1] In fact, the U.S. adult population grew faster than the nation's total population from 2010 to 2020.[2] Worldwide, similar demographic trends are being observed. The World Health Organization (WHO) reports women living longer than men and among the 60+ age group, 54% are women. This proportion has been reported to rise to 60% when women reach 75+ years of age and rise even higher to 70% by the time they reach 90+ years of age.[3] The World Health Organization (WHO) published an up-to-date set of World Health Statistics to 2020, the first year of the COVID-19 pandemic. The report indicates an overall increase in life

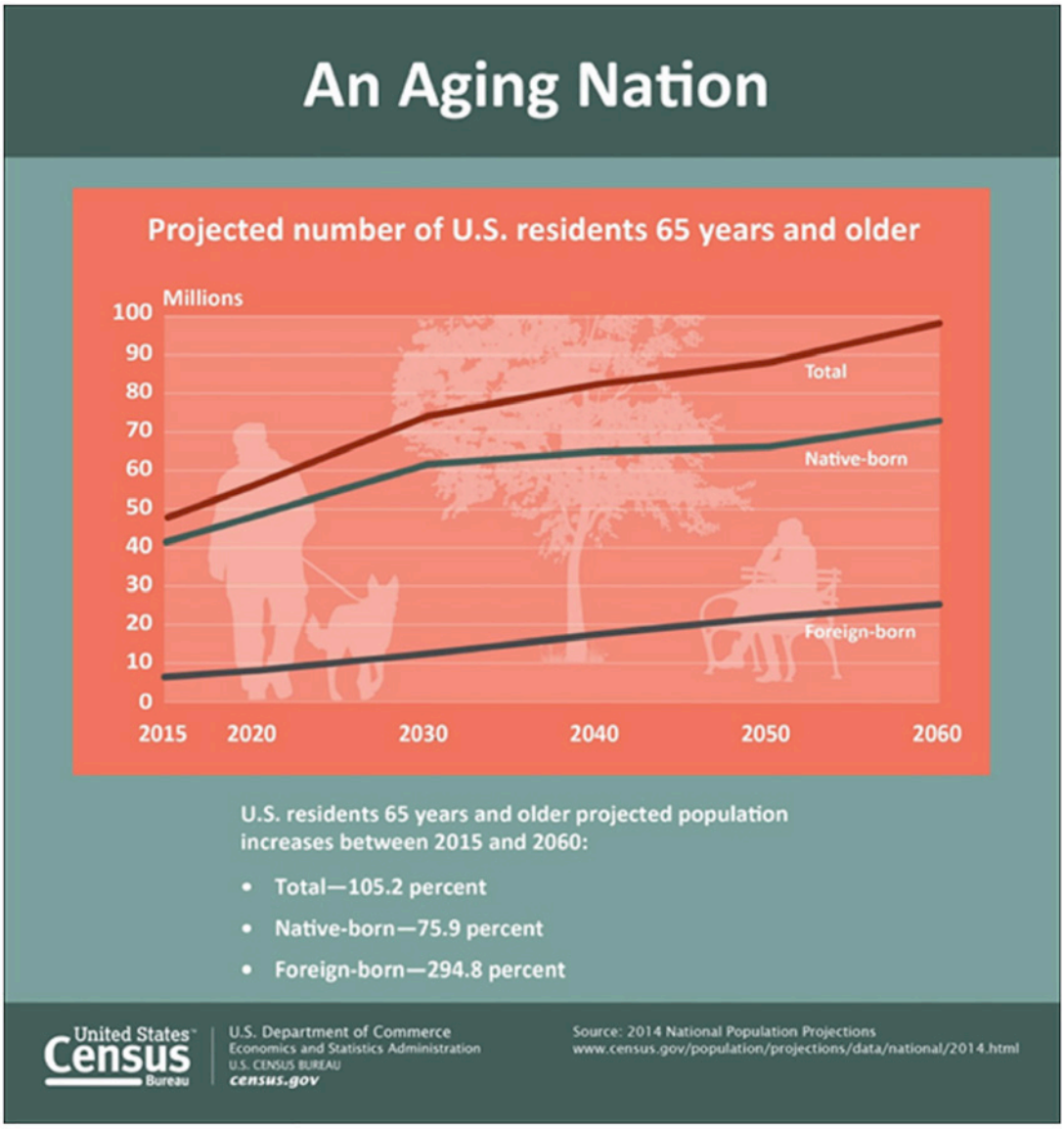

Figure 1. An Aging Nation.

expectancy and healthy life expectancy over the last 20 years, as a result of reductions in maternal and child mortality and in premature mortality due to noncommunicable diseases, which have both had a positive impact on global health. However, the pandemic caused an estimated 4.5 million additional deaths in 2020.[4] The deaths due to the COVID-19 pandemic are estimated to negatively impact global progress on both life expectancy and healthy life expectancy made in the first 20 years of the century. Since early 2020, the COVID-19 pandemic has caused a huge disruption to global health and the functioning of health systems. Currently, life expectancy at birth, for both sexes combined, is 73.2 years. For females, it is 75.6 years, and for males, 70.8 years.[5] In fact, evidence indicates that women on average are outliving men by six years in the developed countries and only three years in low-income countries. Numbers globally representing people 65+ has been reported to increase from 390 million to over 800 million by 2025. The expectation is that no country will report a life expectancy of less than 50 years; however, more than 50 million people now live in countries representing a life expectancy of less than 45 years.[6]

Figure 2. 2022 Leading Causes of Death[7]

The impact from these demographic trends may indicate women living longer; however, a longer life does not guarantee a healthier one free from disease. The fact women are living longer does not guarantee they are enjoying the quality of their life. The likelihood of women suffering from multiple chronic diseases increases with age,[8] and recent studies linking periodontal health to the progression of systemic conditions demonstrate the need to understand women's aging complexities even greater. A UN report published in 2022 indicates that women's and children's health has suffered tremendously globally, as the impacts of geographical conflict, the COVID-19 pandemic, and climate change intersect with disastrous effects on health outlooks for children, young people and women.[9] As the numbers of aging women increase worldwide, oral health care professionals face significant challenges and opportunities in recognizing sex/gender specific health concerns that ultimately impact the overall well-being of their patients.

This course will focus on three common conditions women may potentially experience as they age: stroke, rheumatoid arthritis, depression, and the COVID-19 pandemic. It will further discuss risk factors and research-based approaches to treatment protocols and prevention. Oral health care treatment guidelines, and home care products specifically tailored to promote oral health will be addressed.

I. Stroke in Women

Statistics

Stroke has become a worldwide health concern for women. Traditionally, it was viewed as a man's disease; however, the reality is stroke and heart disease are the cause of 8.6 million annual deaths and are ranked third among deaths in women globally. With a staggering three million women dying yearly from stroke, 2.1. million are reported dying from hypertensive disease along with some form of inflammatory heart disease. However, women from low to middle-income countries are more likely to become disabled from a stroke than men and additionally suffer from an increase proportion in overall CVD deaths.[10] The Office of Women's Health at the Centers for Disease Control and Prevention identifies stroke as the third cause of death among American women and a leading cause of disability. Stroke has been associated with more than 137,000 yearly deaths representing one in every eighteen people and with someone dying from a stroke every four minutes. Among females 20 years of age and older between 2015 and 2018, 44.4% had some form of cardiovascular disease,

compared with 54.1% of males.[11] Cancer is still believed to be more of a threat in the minds of women; however, heart disease is more deadly as the number one killer in women than all types of cancer combined, and only one in five women understand heart disease and stroke to be their greatest health risk.[12] Hence, the knowledge of stroke risk factors, prevention and treatment is critically important.

Stroke has several modifiable risk factors allowing 80% of them to be preventable; yet 795,000 Americans suffer yearly from either a new or reoccurring stroke.[13] It is estimated that 55,000 more American women than men experience stroke and reported one in five women will suffer from a stroke during her lifetime. Women's stroke statistics report 77,109 deaths in one year versus 52,367 male deaths due to strokes.[9] Differences in contributing factors generally indicated at the time women experience a stroke than men are advancing age and poorer health.[14] See the infographic from the American Heart Association.[15] In one study, black and Hispanic females ≥70 years of age had higher risk of stroke compared with white females after controlling for age, sex, education, and insurance status.[16] The American Heart Association reports 3-4% of all people who survived a first stroke are more likely to suffer a second one and women more likely suffer poorer outcomes than men.[11]

Stroke is the second-leading cause of death and the third-leading cause of death and disability combined.[17] Women wait longer for care than men in hospital emergency rooms, and those women patients coming into the emergency room wait 12 minutes longer to be evaluated and treated.[17] Women 65+ represent the largest number of stroke survivors,[17]and considering their longer life expectancy, among those survivors, women will more likely live alone than men. Subsequently, a woman's hospitalization will be longer than a man's, and women will less likely go home or to a rehabilitative facility, yet they are more likely to be transferred to chronic care facilities[18,19] ultimately affecting their quality of life and future independence. Witnessed in both developing and developed countries worldwide, stroke has become one of the five most important causes of disability,[20] killing six million annually, and leaving five million permanently disabled.[21]

Worldwide, stroke among the 60+ age group is the second leading cause of death after CVD and fifth leading cause in ages 15-59 (Figure 3).[22] Without worldwide interventions, it is estimated by 2030 there will be 7-8 million deaths from 23 million strokes yearly.[23] The incidence of stroke has been declining in many developed countries; however, the actual number will increase due to aging populations, and worldwide projections indicate stroke becoming the second cause of death following ischemic heart disease among these aging populations.[20]

- The estimated global cost of stroke in 2021 was over US$891 billion (1.12% of the global GDP).[22]
- There were large geographical differences in age-standardized stroke incidence, mortality, prevalence rates, with the highest rates in Eastern Europe, Asia, and Sub-Saharan Africa.[22]
- The burden of stroke is particularly serious in Asia; its mortality is higher than in Europe or North America.[24] In China, there are 2.5 million new stroke cases each year and 7.5 million stroke survivors.[25]
- Stroke is the third leading cause of death in Canada and the tenth largest contributor to disability-adjusted life years. The first stroke occurs more among men than women over time but more women than men have a stroke each year, in part because women have a longer life expectancy.[26]
- Stroke is one of the biggest killers in the UK, with more than 100,000 occurring each year, causing around 34,000 deaths each year.[27]
- While the stroke burden and attributable burden to stroke risk factors have decreased during 1990-2019. In the Middle East and North Africa, it is still unacceptably high, particularly in low-SDI (Socio-demographic Index) countries.[28] In fact, 87% of global stroke mortality rates are occurring in low and middle-income countries.[23]

Figure 3. Global Stroke Facts.

American Stroke Association.
A division of the American Heart Association.

American Heart Association. Go Red for women.

Women face higher risk of stroke

STROKE IN U.S. WOMEN BY THE NUMBERS

One in 5 women will have a stroke.
About 55,000 more women than men have a stroke each year.

#3 cause of death

Stroke is the No. 3 cause of death in women.
Stroke kills over 85,000 women a year.

Among women, Black women have the highest prevalence of stroke.

TALK TO YOUR HEALTH CARE PROFESSIONAL ABOUT HOW TO LOWER YOUR RISK

and use the American Heart Association/American Stroke Association prevention guidelines:

STROKE RISK INCREASES IN WOMEN WHO:

Are pregnant
Pregnant women are three times more likely to have a stroke as non-pregnant women of the same age.

Have preeclampsia
This dangerous condition of high blood pressure during pregnancy doubles stroke risk later in life.

Take birth control pills
These can double the risk of stroke, especially in women with high blood pressure.

Use hormone replacement therapy
It doesn't lower stroke risk if postmenopausal, as once thought.

Have migraines with aura and smoke
Strokes are more common in women who have migraines with aura and smoke, compared with other women.

Have atrial fibrillation
This quivering or irregular heartbeat can increase stroke risk fivefold.

STROKE RISK DECREASES IN WOMEN WHO:

Talk to their health care professional to **determine safest medication** if pregnant with high blood pressure.

Discuss with their health care professional **low-dose aspirin guidelines** starting in the second trimester (week 12) to lower preeclampsia risk.

Get their blood pressure checked before taking birth control pills and monitor every six months.

Review the risk and benefits of hormone replacement therapy with their health care professional and discuss if the benefit outweighs the risks. For some women, it might not.

Quit smoking. All women who experience migraines and smoke should avoid smoking, nicotine use, vaping and e-cigarettes.

Get screened for atrial fibrillation if over the age of 75 as this condition then becomes more common in women.

Learn more at stroke.org

Know Your Risk Infographic[15]

Stroke Conditions

Cerebrovascular accident (CVA) commonly known as stroke, is a sudden interruption of oxygenated blood to the brain, resulting in brain cell death.[29] Ischemic strokes account for 85% of all strokes, resulting from a blocked artery insufficiently supplying the brain with necessary oxygen and nutrients. Hemorrhagic strokes, responsible for 15% of strokes, occur from ruptured blood vessels leaking blood in or around surrounding areas of the brain.[30] The cells that die can leave a woman with the inability to speak, feel, think, move or even recognize family and friends. It is estimated that two-thirds of the survivors have to pursue rehabilitative measures in order to regain abilities, learn how to compensate for those lost and develop new strengths.

The effects from a stroke are determined by the location of damage within the brain (Figure 4). When cell death occurs in the cerebellum (the lower back portion of the brain), coordination, movement, reflexes and balance are affected. Whereas, with damage to the frontal lobe and left side of the brain, a woman would be unable to articulate speech even though understanding what was being communicated and knowing what she desired to say. With damage to the left temporal lobe, comprehension of language would be impossible, even though she would be able to articulate words. To better understand the effects of a stroke, it is important to understand the location of damage in the brain. When one hemisphere of the brain suffers from a stroke, consequently, the opposite side of the body's functioning becomes impaired. When a stroke occurs in the right hemisphere of the brain, vision may be impaired in both eyes, and difficulty can occur in lifting the left arm or smiling from the left side of the mouth.

A stroke, depending on the location of brain damage, can produce weakness or paralysis on one side of the body, muscle spasticity, difficulty in coordinating movement, and trouble swallowing. If the stroke occurs in the left side of the brain, the right side of the body will be affected, and vice versa. Numbness, ongoing aches and pain and sensory changes may be produced. Difficulties can occur in expressing oneself in words as well as understanding speech. Memory loss, impaired thinking, disorientation, inability to complete tasks along with denial of disabilities are cognitive problems, if left untreated, can potentially undermine any rehabilitation.[31]

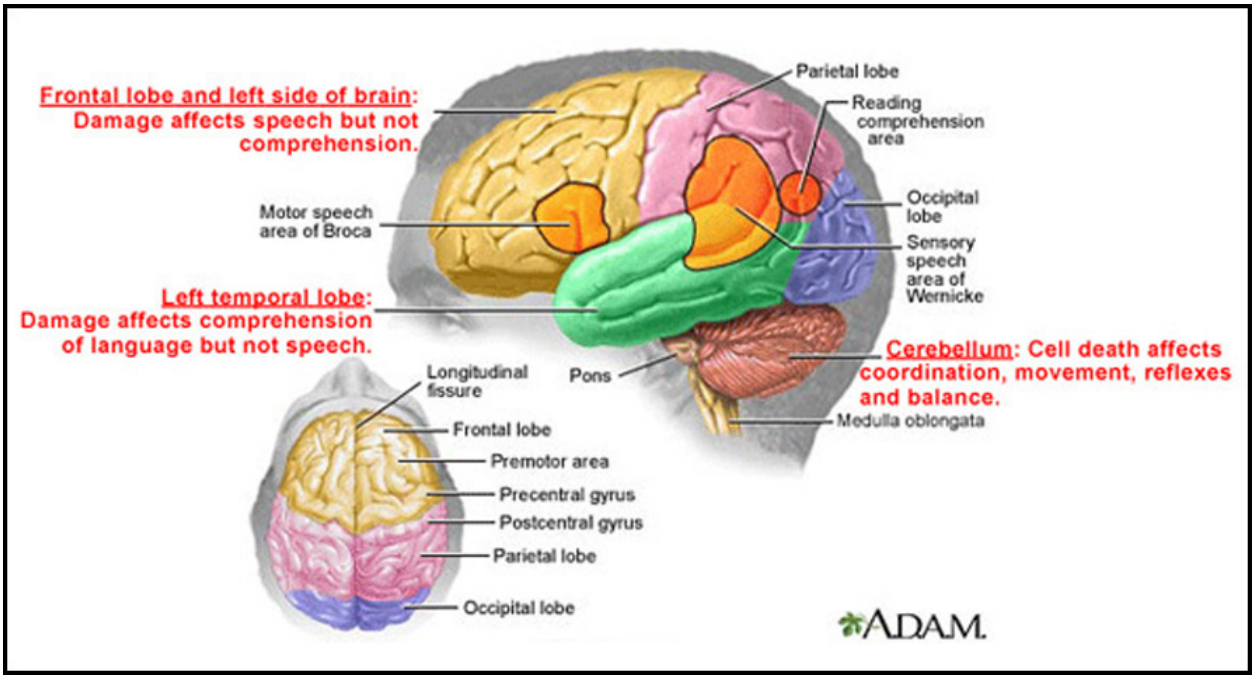

Figure 4. Location of Damage Within the Brain.

Risk Factors in Women

While men and women share similar risk factors for stroke as with other chronic conditions, stroke is often caused from a combination of factors and sex/gender-specific risk factors do exist. Oral contraceptive use combined with smoking has demonstrated higher stroke and heart attack risks than in non-smokers using birth control protection.[32] In 2002, the Women's Health Initiative trial of hormone replacement therapy (estrogen-plus-progestin) was discontinued due to CVD incidences and increased risk for strokes among women participating. The current recommendation for hormone therapy is at the lowest effective dose and for short-term relief. If consideration for its use is necessary, the benefits and risks should be discussed with a physician.[18]

Stroke risk increases after age 55, and a woman's risk more than doubles each decade following.[33] Ethnicity represents a risk factor. African-American women exhibit an increased risk for stroke and heart attack more than white Caucasian women, and compared to white Caucasian, African-American women and men are more likely to die from stroke.33 Risk factors increase if a family history of stroke exists, especially with a first-degree relative, a personal history, heart attack or heart related conditions. Having experienced a transient ischemic attack (TIA), known as a mini-stroke, increases the risk ten-fold regardless of sex/gender and age.[33] High blood pressure is considered one of the major risk factors for heart attacks and the most critical factor leading to strokes. People who have high blood pressure have one and a half times the risk of having a stroke compared to those who consistently have optimal blood pressure of 120/80.[34] Obesity/overweight are primary risk factors for stroke for men and women of all races. An excess of fatty tissue has been shown to have a significant association with risk of stroke/transient ischemic attack (TIA), independent of other vascular risk factors. Waist circumference and related ratios can better predict stroke than BMI. Overweight individuals present with additional risk factors, such as sleep apnea, left ventricular hypertrophy, Syndrome X, and diabetes.[35]

Strokes occur twice as often in diabetics with hypertension than those with hypertension alone.[36] Adults with diabetes have two to four times greater death rates than adults without. Diabetics often exhibit elevated blood pressure levels, cholesterol, and obesity and overweight concerns posing them at greater risks for CVD conditions[18] and six times greater risk for stroke than those without diabetes.[37] Controlling and maintaining blood pressure levels can reduce risks of strokes by 30-40%.[18]

Reported data from the Women's Health Study indicated abnormal cholesterol levels doubled risk factors for ischemic strokes in healthy women. The results were from one of the first studies to confirm a link between stroke risks in women with no prior CVD conditions. Additionally, the study provided supporting data from clinical trials demonstrating statin medications reducing stroke risk.[38] Studies have indicated women's cholesterol levels tend to be higher than men's from age 55+. Research has indicated low levels of HDL cholesterol (the good cholesterol), and higher triglyceride levels in women appear as stronger risk factors for stroke and heart disease than observed in men. Smoking remains one of the major causes of CVD among women.[13] Smoking can double the chances of ischemic strokes and hemorrhagic stroke risk quadruple from tobacco use.[37] Tobacco usage can elevate blood pressure, damage the lining in blood vessels, increase risk for blood clots, and lower beneficial HDL cholesterol – all serious risk factors for potential strokes. Data from The Nurses' Health Study indicated women who quit smoking lowered their stroke risk by 25% within a one to two-year period, and after five+ years, the risk was equivalent to someone who never smoked.[18]

According to the American Heart Association, a woman with more risk factors increases her chance of experiencing a stroke or heart attack. Many of the identifiable risk factors (Table 1) cannot be modified such as: family health history, race, increasing age and sex/gender. Yet, many of the modifiable factors: high cholesterol, high blood pressure, diabetes, obesity, (Figure 5), lack of exercise and smoking can be treated or controlled by medication along with making positive changes in lifestyle habits.[13]

Non-Modifiable Risk Factors	Modifiable Risk Factors
	✓ Hypertension
	✓ Heart Disease
	✓ Smoking, especially when combined with oral contraceptives
✓ Advancing Age	
✓ Sex/Gender	✓ Diabetes
✓ Family History of stroke	✓ Unhealthy diet
	✓ Physical Inactivity
✓ Personal history of stroke	✓ Obesity and Overweight
✓ Ethnicity/Race	✓ Excessive alcohol intake
	✓ High total cholesterol levels
	✓ High triglyceride levels

Table 1. Risk Factors for Stroke in Women.

- According to the Women's Health Study, obese women (those indicating a BMI score of 30+) were 50% more likely to suffer a stroke in comparison to healthy BMI scores under 25.[18]
- In fact, the Nurses' Health Study reported being overweight was not a single concern; however, gaining weight and especially in the waist area posed for serious consequences. Adult women gaining 22 to 24 pounds were 70% more likely to suffer ischemic strokes compared to women who maintained their weight.[18]
- Older women are heavier now than a decade ago, and according to the WHO, the number of people considered overweight will increase to 1.5 billion by 2015.[35]
- The American Stroke Association recommends to stay away from diets high in trans fats, saturated fats, and reduce salt intake in order to further reduce risk of stroke.[35]

Figure 5. Obesity and Stroke in Women.

After suffering from a stroke, odds can be reduced in having another by necessary medications, altering diets, and implementing healthy habits. Reducing the risk of ever having a stroke starts with healthy lifestyles, regular medical examinations detecting at-risk conditions, and positive steps towards controlling any one of the risk factors.

According to the Women's Health Study, monitoring 38,000 participants for 10 years proved that risk factors really matter. The study indicated women with the greater number of healthy habits, BMI scores less than 22, who never smoked, ate a diet high in fiber, omega-3 fatty acids, folic acid, low in trans fat, saturated fat and refined carbohydrates, had four to 10 alcoholic beverages weekly, and exercised four or more times weekly were 71% less likely to suffer from an ischemic stroke.[18]

Prevention and Treatment Measures

Understanding risk factors and how to minimize their likelihood is a necessary first step towards making significant impacts in stroke prevention. When blood pressure readings are 140/90 mmHg or higher, and 130/80 mmHg or higher in diabetics, yearly monitoring is recommended. Monitoring can occur every two years if normal levels of 120/80 mmHg exist. Cholesterol levels should be checked every five years using a fasting lipoprotein profile. According to the American Heart Association, women should maintain total cholesterol below 200 mg/dL; HDL above 50 mg/dL; LDL below 100 mg/dL; and triglyceride levels below 150 mg/dL. It is necessary to implement lifestyle changes including a healthy diet, reduction of salt intake, regular exercise, and weight reduction in order to reduce and maintain blood pressure and cholesterol levels. Fortunately, there are preventive treatment measures and lifestyle recommendations emphasizing healthy eating patterns low in saturated fats, and avoiding trans fats, each assisting in cardiovascular benefits. Suggestions for a healthy diet are listed in Table 2.

In addition to following a healthy diet, losing weight and regular exercise, medications, if necessary, have also been used to lower blood pressure, such as:

- Angiotensin-converting enzyme (ACE) inhibitors
- Diuretics
- Angiotensin-receptor blockers
- Beta blockers or alpha blockers

Table 2. Suggestions for a Healthy Diet.

- Three to six daily servings of grains, with half as whole grains (brown rice, 100% whole-grain cereal and whole wheat bread) rather than white bread, pasta made from refined flour, and white rice.
- At least five or more daily servings of fruits and vegetables. The darker and brighter the vegetable, the better for antioxidants, nutrients, and fiber content.
- Four weekly servings of seeds, nuts, and legumes. These are great substitutes for meat and poultry.
- Two servings weekly of fish, especially salmon and mackerel rich in omega-3 fatty acids.
- Olive and canola oils in small amounts are acceptable along with corn and sunflower oils.

The formation of blood clots can occur from an abnormal heart rhythm, and with clot breakage, ischemic strokes potentially occur. Anticoagulants such as warfarin (Coumadin) or aspirin assist reducing the potential for blood platelets to form clots. Blood clotting medications have shown a 68% reduction of risk for ischemic strokes.

Total cholesterol, low-density lipoprotein cholesterol, the total cholesterol to high-density lipoprotein cholesterol ratio, and non-high-density lipoprotein cholesterol were significantly associated with increased risk of ischemic stroke.[38] Medications are often recommended if target cholesterol and triglyceride levels have not been achieved after three months of lifestyle changes, LDL cholesterol levels are 190 mg/dL+, and/or personal history identifies one or more risk factors (e.g., heart disease, diabetes, prior stroke, low HDL's, and high triglycerides). Such options are:

- Statins, Niacin, and Fibrates all used to reduce triglyceride and LDL levels and raise HDL's.

Statin medications are recommended beyond their cholesterol-lowering effects and are commonly prescribed for ischemic stroke patients upon discharge from the hospital.[37] Discontinuing statins can cause changes in platelet activity or inflammation increase their risk of cardiovascular events and dying.[39]

Aspirin has been used as a preventive medication for cardiovascular diseases. Findings from randomized trials totaling >47,000 patients questioned the clinical benefits of aspirin in primary prevention for three key populations: patients with diabetes mellitus, community-dwelling elderly individuals, and patients without diabetes mellitus who are at intermediate risk for atherosclerotic events. At the present time, most patients without recognized atherosclerotic cardiovascular disease should not be prescribed aspirin. Instead, management of comorbidities customized to the expected cardiovascular risk should be implemented.[40] The guidelines for the prevention of stroke in patients with stroke and transient ischemic attack published in 2014 was updated in 2021, in a document entitled "The 2021 Guideline for the Prevention of Stroke in Patients With Stroke and Transient Ischemic Attack".[41,42] According to the 2005 Women's Health Study, healthy women taking a low dose aspirin every other day showed a risk reduction for ischemic strokes by 24%, yet the risk for hemorrhagic strokes rose by 24%. The CVD benefits for women age 65+ taking daily aspirin demonstrated a 34% reduction in heart attacks and fewer ischemic strokes by 30%. The Women's Health Study further reported that healthy women under age 65 may suffer greater side effects such as gastrointestinal bleeding, bruising, and increased risk for hemorrhagic strokes versus modest benefits

from daily aspirin use. Furthermore, healthy women 65+, and younger women with family history of CVD should consult their physician regarding a low dose aspirin therapy (81 mg aspirin).[43]

Cigarette smoking is an independent, powerful, and dose-respondent risk factor for first ischemic stroke,[43] approximately doubling the risk of stroke.[37] Patients who have had a stroke or TIA should avoid smoking and second-hand smoke. Counseling with or without pharmaceutical intervention, such as nicotine replacement, is recommended. Research studies have indicated a five-step approach to quitting along with smoking cessation programs encompassing the following suggestions:[45]

- Set a quit date. Make a commitment publicly to people who will support you on your path to quitting.
- Choose a method for quitting. Cold turkey, decreasing the number of cigarettes smoked, or decreasing how much of each cigarette you will smoke.
- Decide if you need pharmaceutical aid or other help to quit, (such as gum, spray, patch, inhaler) or prescription medicines such as bupropion hydrochloride or varenicline. Plan for your Quit Day.
- Stop smoking on your Quit Day.

Get at least 150 minutes per week of moderate-intensity aerobic activity or 75 minutes per week of vigorous aerobic activity, or a combination of both, preferably spread throughout the week. Moderate-intensity exercise such as walking, swimming, and bicycling can assist in recovering from a stroke and reduce the risk for another CVA event. Add moderate- to high-intensity muscle-strengthening activity (such as resistance or weights) on at least 2 days per week. Utilize a physical therapist to design a tailored program if a stroke-related disability has occurred.[46]

- Regular monitoring of blood pressure, cholesterol and glucose levels
- Healthy Diet
- Regular Exercise
- Maintaining a healthy weight
- Limiting Alcohol Intake

Table 3. Preventive Measures.

Oral Connections

The potential for active periodontal inflammation to affect overall health, including cardiovascular disease and stroke, has initiated research to further study linkages between oral health and systemic disease. A special report published in Scientific American and a supplement to the Journal of the American Dental Association explored potential links between oral infections and systemic relationships; however, the causality of the relationship has yet to be fully determined.[47] Such potential relationships afford unprecedented opportunities for oral health care professionals to collaborate with the medical profession in addressing the management of systemic disease.

Associations between hyperlipidemia, hyperglycemias, and periodontal disease and CVD and stroke have been documented.[48,49] Periodontal and cardiovascular diseases share many risk factors, such as age, educational level, sex/gender, income level, smoking and drinking habits, hypertension, stress, depression, and diabetes.[50] Researchers suggest specific bacterial inflammatory responses trigger CVD and CVA events. It is now clear from the epidemiologic studies that a potential link does exist between PD and CVD.51 In a recent hospital based study in stroke and TIA patients, there was no link between high periodontal disease and recurrent vascular episodes.[52]

While precise links and causal factors between CVD, stroke and periodontal disease continue to be researched, oral concerns commonly associated with medications are well-documented.[53] With numerous reports in medical and dental journals substantiating a periodontal-systemic relationship, the role of oral health care professionals to risk assess patients demonstrating inflammatory burdens, recognize oral adverse reactions often encountered from medications, and educate patients about the benefits from daily self-care regimens will improve oral health outcomes and further establish oral health as an essential component necessary for overall health.

With a yearly estimate of 15 million people worldwide suffering from stroke, recognition and treatment for gingival and inflammatory periodontal diseases can potentially minimize further risk for systemic disorders. Oral healthcare professionals can identify patients who are unaware of their risk of developing serious complications as a result of CVD, who are in need of medical intervention, and provide appropriate referrals.

II. Rheumatoid Arthritis

The Condition

Rheumatoid Arthritis (RA) is an autoimmune disease from unknown reasons resulting in chronic inflammation affecting synovial joints in the fingers, hands, and feet. Larger joints in the knee and shoulder can also be affected and conditions will vary among individuals. The inflammation is often found in multiple joints, usually, yet not always occurring in a symmetrical pattern involving the destruction of bone and cartilage. Inflammation can create swollen, tender, stiff and often permanently deformed joints resulting in decreased movement and even loss of function. Fingers can exhibit a deviated, unnatural shape spanning towards the little finger (Figure 6). Typically, after waking, an increased stiffness can occur, identified as a prominent feature lasting as long as one hour.[53]

RA has been classified as a systemic disorder meaning the immune system attacks the body's tissues leading to destruction and inflammation spreading to systems and tissues known as extra-articular conditions or "outside the joints" existing in approximately 15% of those diagnosed with RA.[54] Lymph nodes may become inflamed, and in aggressive systemic conditions nodules can occur under the skin and around joints, which are associated with a poor prognosis. It has been reported approximately 40% with RA also suffer with pericarditis affected by the inflammatory process.[55] Those with RA have a 50% to 70% higher risk for cardiovascular disease than the general population, and are twice as likely to have a heart attack compared to those who don't. [56] Over one-third of deaths with RA were attributed to a cardiovascular condition identifying cardiovascular disease as a major factor in the increased mortality among those with RA.[54]

Figure 6. Hands of a patient with Rheumatoid Arthritis.

Global Trends and Statistics

RA may or may not produce noticeable clinical manifestations, is unpredictable in duration and is incurable. It is estimated around 1.3 million US adults have RA with it occurring in three to one times as many women than men,[58] and the prevalence and incidence rises with advancing age. Age onset is after 40 and peaks around age 70, then declines.[58] The prevalence of RA varies throughout the world, with an overall higher prevalence in industrialized countries.[59] This may be due to exposures to environmental risk factors, as well as by genetic factors, differing demographics and under-reporting in other parts of the world.[60] However, among Native American groups, the prevalence rates are 5-6%; with lower rates documented in the regions of the Caribbean.[62] A prevalence study among white Europeans was equal to South African urban blacks, while lower rates were noted among South African rural blacks.[62] It has been challenging for most countries to conduct incidence and prevalence studies on RA due to limited health data systems and sampling size.[60]

In some countries, such as Sweden and Finland, registrars collect data based on medication and diagnostic criteria representative from community-based surveys. In the United Kingdom, a network of physicians document reason for medical consultations; however, some diagnoses could be viewed as biased.[60]

The World Health Organization (WHO) in joint efforts with the International League of Associations for Rheumatology (ILAR) have developed community studies to determine prevalence and risk factors and to educate health care providers in the area of prevention and treatment based on RA symptoms and complaints.60 Over two decades of results are available from Thailand, Pakistan, China, India, Kuwait, Brazil, Vietnam, Mexico, Chile, Australian Aboriginals and Australian Caucasians with additional studies ongoing.60 The prevalence varied among the industrialized countries between 0.3 and 1%; with an overall 0.8% for adults over age 15. In developing countries, some studies reported lower prevalence rates while others were similar to levels in developed countries. With worldwide demographic trends demonstrating an aging population, an increase in RA is expected over the next 10 years in North America and Europe, yet prospective studies are suggested to continue.[60]

Risk Factors

Environmental, genetic and hormonal factors having an association with the immune system's attack on body joints have been speculated as potential risk factors for RA.[38] Since specific causative agents have yet to be identified, suppressed immune systems, and infections serve as contributing factors in some individuals. Inflammation affecting organ systems contributes to systemic manifestations.[58] Evidence is mounting around infectious agents, such as bacteria or viruses triggering RA conditions in susceptible individuals.[58] The Human Herpes Virus 6 (HHV-6) and Epstein-Barr virus (EBV) have been confirmed in epidemiological studies to have potential associations.[51] RA is familial with a 2-3% prevalence rate for first-degree relatives, and a genetic disease component with identical twins is approximately at 15-20%.[62] Genetic components demonstrating positive RA factors have been associated with disease severity and may interact with a well-defined environmental factor such as cigarette smoking.[58,63] In fact, smokers are four times more likely to exhibit RA conditions than non-smokers.[63]

Individuals with autoimmune disorders suffer from the inability to recognize foreign invaders from their body's own. Clusters of genetic markers, HLA-DR4/DR1 occur in 90% of those with RA, allowing susceptibility through genetic factors and infectious episodes triggering autoimmune responses.[63,64]
Research has suggested complex interactions exist between RA and estrogen and female sex hormones as influencing risks. The onset of RA is rare during pregnancy, can often return post-delivery, and is more common among nulliparous women. Oral contraceptive use seems to reduce the risk of developing rheumatoid arthritis (RA) by 13%, according to a Swedish population-based case-control study. Nulliparity, frequency of oral contraception use, and breast-feeding may all influence the epidemiology of RA. Breastfeeding has been associated with a decreased risk of RA, and a long duration of breastfeeding appears to have the strongest association. However, some studies have found an increased RA risk.[65]

Diagnosis

Diagnosing RA is challenging even during its early stages due to the variety of symptoms; many appearing similar to other arthritic disorders characterized with intense pain. A rheumatologist, specializing in diseases of connective tissue and joints typically is the one to diagnose and prescribe long-term management approaches. A physical examination, discussion of symptoms, x-rays (Figure 7) and a blood test comprise an essential diagnostic work-up. X-rays may not clearly identify bone changes in early stages; whereas ultrasound and magnetic resonance imaging (MRI) provides greater sensitivity in detecting early joint damage and erosions.[66]

Figure 7. X-ray of patient with Rheumatoid Arthritis.

Immunological testing determines the presence of a specific antibody, rheumatoid factor (RF), identified in approximately 80% suffering with RA after one year.[67] Rheumatoid factor-positive patients may also have a higher disease activity score, meaning frequent flare-ups and fewer remission periods.[68]

RA is a disabling disease with most daily activities impaired. At least 50% of those diagnosed ten years from onset are unable to maintain full time employment. Those diagnosed before age 45 encounter greater disabilities than those diagnosed at 70+.[58]

Prevention and Treatment

Unfortunately, there is no cure for RA. The key to maintaining a quality of life while living with RA is determined by the management of treatment. In order to reduce inflammation, relieve pain and improve function, the following treatment suggestions include:

	Score
Target population (Who should be tested?): Patients who 1. have at least 1 joint with definite clinical synovitis (swelling)* 2. with the synovitis not better explained by another disease†	
Classification criteria for RA (score-based algorithm: add score of categories A - D; a score of ≥6/10 is needed for classification of a patient as having definite RA)‡	
A. Joint involvement§	
1 large joint¶	0
2-10 large joints	1
1-3 small joints (with or without involvement of large joints)#	2
4-10 small joints (with or without involvement of large joints)	3
>10 joints (at least 1 small joint)**	5
B. Serology (at least 1 test result is needed for classification) ††	
Negative RF *and* negative ACPA	0
Low-positive RF *or* low-positive ACPA	2
High-positive RF *or* high-positive ACPA	3
C. Acute-phase reactants (at least 1 test result is needed for classification) ‡‡	
Normal CRP *and* normal ESR	0
Abnormal CRP *or* abnormal ESR	1
D. Duration of symptoms§§	
<6 weeks	0
≥6 weeks	1

Figure 8. 2010 Rheumatoid Arthritis Classification.[69]

- Lifestyle modifications through proper and regular exercise
- Medications
- Surgery

Lifestyle
Exercise and learning how and what techniques to use becomes a vital skill for those with RA. Personalized exercises can be designed by a physical therapist to assist in maintaining muscle strength and flexibility without overusing joints. Swimming is ideal, as this exercise avoids stress being placed on joints. Splints are recommended in order to immobilize and support joints while resting.[70] Cold or hot applications have assisted in palliative treatment measures used prior or after exercise therapy. Occupational therapists can provide helpful alternatives in reducing joint stress while performing daily activities with devices assisting in writing, lifting objects and eating. Foods that are high in antioxidants may help reduce inflammation, and resting is important. Be aware that 1 in 3 people with chronic arthritis also suffer from depression.[71]

Medications
A broad range of medications have been FDA approved to treat RA. They vary in cost, effectiveness and side effects. Some physicians recommend supplements, yet little evidence is available to qualify their effectiveness. Some research studies indicate omega-3 fatty acids, those in plant seed oils and certain fish, can potentially reduce inflammation, yet the recommended dose for positive effects appears too difficult to tolerate. If supplements or herbal remedies are considered, the physician should be consulted as many medications can interact negatively.[72]

Medications fall into several categories, each requiring careful monitoring with periodic blood screening tests (Table 4). Analgesics and anti-inflammatory agents assist in relieving stiffness, pain and inflammation; however, they do not slow disease progression or prevent joint damage. Documented long-term effects from cortisone therapy have been determined undesirable; nevertheless, cortisone injections used adjunctively in treatment regimens have proven valuable.[73]

Disease modifying anti-rheumatic drugs (DMARDs) are prescribed for altering the disease course while preventing joint and bone damage occurring from secondary inflammatory responses. They have been used separately or in combination with other medications with results reported as early as one month and up to six months from initial treatment. Early treatment with one effective DMARD, methotrexate, has shown favorable outcomes in RA years afterwards. Those prescribed with methotrexate continue with treatment regimens longer than other medications due to lessened side effects, effectiveness in controlling symptoms, and its ability to work in combination with biological agents. Immunosuppressant medications are used for those co-existing with systemic disease.[67,73]

The latest category of medications are biological response modifiers (BRMs) known as biologics and are used to treat aggressive and debilitating cases when standard methods from one or more DMARDs have shown unfavorable responses. The BRMs target against cytokines triggering inflammation and approximately 70% of patients report improvement within the first two weeks from initial therapy. Their continued use is necessary in order to maintain results. When BRMs are combined with DMARDs, specifically methotrexate, greater efficacy has been indicated. BRMs exhibit few adverse reactions, unlike DMARDs yet side effects from long-term use remain unclear. BRMs are either injected or infused and mild skin irritations can occur at the injection site. Since BRMs suppress immune system functions, those individuals with active infections, including tuberculosis, or those prone to infection (e.g., diabetics) should be screened by their physician prior to treatment. Annual expenses for BRMs range from $17,000 to $25,000 with varying degrees of health insurance coverage.[73]

Surgery and Long-term Prognosis
Orthopaedic surgery such as joint replacement has offered relief from severely damaged joints, including alleviating constant pain, and enhancing mobility and function. Reconstructive hand surgery is used to

Table 4. Medications used for Rheumatoid Arthritis.[73,74]

Medications	Effects	Side Effects
1. Analgesics & Anti-Inflammatory Agents:		
Analgesic agents:	**Pain relief only, do not reduce inflammation**	
Acetaminophen (Tylenol) Rx: Acetaminophen with codeine (Tylenol with codeine) Acetaminophen with hydrocodone (Vicodin)		
Anti-inflammatory agents:		
Nonsteroidal anti-inflammatory drugs (NSAIDs)	Can also act as analgesics, aim to relieve pain, stiffness & inflammation, yet do not prevent joint damage or slow the disease progression	
Aspirin, Aleve, Ibuprofen (Advil, Motrin) Ketoprofen (Orudis) Naproxen (Naprosyn) Doclofenec (Voltaren)		Reduce swelling, upset stomach, easy to bruise, ulcers, kidney & liver damage increased risk of CVD
Newest of the (NSAIDs) Cyclooxygenase-2 (Cox-2) Celecoxib (Celebrex)		Stomach issues (indigestion, ulcers, bleeding at a lower rate than with other NSAIDS, increased risk of CVD
***All Rx (NSAIDs):** **Including Celebrex carry a FDA warning regarding the risk of heart attack and stroke, and potential life-threatening stomach bleeding.**		
2. Corticosteroids	**Can produce symptomatic benefits & have serious long-term consequences**	
Prednisone (Deltasone, Orasone) Methylprednisolone (Medrol)	Suppress immune system & slow inflammation, produce dramatic improvement in short time	Serious long-term effects, osteoporosis, bruising, mood changes, weight gain, muscle weakness, diabetes, cataracts, increased chance of infection, hypertension
3. Disease-modifying antirheumatic drugs (DMARDs)	**Alter course of disease, prevent cartilage & joint destruction-may take weeks or months for effects**	

Table 4. ***Continued.***

Injectable gold		Oral sores, skin rash, kidney & stomach problems, low blood count
Antimalarials (Plaquenil)		Eye problems, upset stomach
Sulfasalazine (Azulfidine)		Upset stomach
Penicillamine (Cuprimine, Depen)		Skin rashes, upset stomach, kidney problems, blood abnormalities
Etanercept (Enbrel)		Etanercept-injection site reaction
4. Immunosuppressants	***Are used for patients with systemic disease (all may cause birth defects)**	
Methotrexate (Rheumatrex)	Suppress immune system, arrest inflammation	Low white-cell count, potential liver problems
Azathioprine (Imuran)		Low white-cell count, increased cancer risk, potential blood cell abnormalities
Cyclophosphamide (Cytoxan)		Low white-cell count, increased cancer risk, other blood abnormalities
Leflunomide (Arava)		Diarrhea, rash, hair loss, liver problems, cancer risk
5. Biological Response Modifiers (BMRs)		
Etanercept (Enbrel) Infliximab (Remicade) Adalimumab (Humira)	Tumor necrosis factor alpha (TNFa) blockers [all begin working in 2 weeks may take up to 3 mos. for max. benefit] Enbrel –injection weekly Humira-injection every 2 weeks Remicade-IV infusion every 2 months, after three initial injections	
Anakinra (Kineret)	Interleukin 1 (IL-1) blocker	Daily injection, may take 4 weeks for benefits, 3 mos. for max. benefit
Abatacept (Orencia)	T cell activation blocker	(IV infusion every 2 weeks to start (first three infusions and every 4 weeks thereafter benefits begin in 2 weeks and may take 3 mos. for max benefit

straighten deformed fingers and seeks to restore their function. Individuals either in the second or third decade of RA who are severely disabled achieve particularly great success from surgical interventions in addition to oral medications. Two studies were performed by researchers at Hospital for Special Surgery, and disputes the perception that RA patients have worse outcomes after a total knee replacement than patients who undergo the operation for osteoarthritis. The second study demonstrates that RA patients who undergo a total hip replacement were as likely to have significant improvements in function and pain as patients with osteoarthritis (OA), even though they did not do as well.[75] Lifestyle modifications along with physical therapy may assist in reducing the burden of disability. It is estimated a 25% further reduction in RA disability can occur in developed countries with proper treatment management being optimally utilized. Research studies have indicated using methotrexate may potentially reduce mortality.[76] Orthopaedic surgery and oral medications may not be available in low-income countries, and steroid therapy is offered too freely and possibly used indiscriminately. In such regions, if medical advice and interventions were available, an estimated 40% reduction in RA disability could occur.[62]

According to the National Rheumatoid Arthritis Society in the UK, factors associated with higher mortality rates include: conditions of severe RA; involvement in organs other than synovial joints; co-morbidity conditions; hospitalization stay; and extensive damage observed on x-rays.[77] Life-shortening effects from RA vary, with some studies indicating a lifespan reduction by five to ten years.[77] RA patients suffer from a doubled risk for cardiovascular disease;[78] independent from risk factors such as diabetes, alcohol abuse and elevated body mass index, blood pressure, and cholesterol. However, deaths from cardiovascular disease among people with rheumatoid arthritis are declining.[78] It remains unknown why RA creates such risk; contributing factors have suggested the presence of chronic inflammation.[79] The impact from inflammation should not be overlooked and especially when treating patients with impaired immune systems.

Oral Connections

RA has been defined as a chronic disease linked with inflammatory factors resulting in destruction of connective tissue and bone deterioration. Those well-defined characteristics are also distinguishing features defining periodontal disease. With each condition, inflammation appears to separate diseased conditions from health. Numerous research studies have suggested relationships may exist between RA and periodontal disease.[80] Each disease exhibits dysfunctional immune systems, genetic risk factors and inflammatory mediators compounding susceptibility; suggesting a co-existing relationship is probable.[81] Chronic inflammation has been defined as a common link supporting systemic manifestations and risk factors for various medical conditions.[8] Research studies continue to explore co-existing factors and their relationships between RA and periodontal disease. A 2008 study published in the Journal of Clinical Periodontology found RA patients were nearly eight times more likely to have periodontal disease compared to the control subjects.[82] A study in 2005 conducted by Al-Shammari and colleagues[83] reported tooth loss from periodontitis and risk factors for severe periodontal disease shared RA as the strongest risk indicator for periodontally-induced tooth loss. Independent of other risk factors, the mechanism by how RA creates the increased risk remains unknown. Early recognition of risk factors and proper treatment protocols are essential in any disease management.

III. Depression

The Condition

Depression affects men and women of all ages; it can be disabling, interfere in daily activities, limit normal functioning, and potentially lead to suicide. Worldwide, it has been estimated 340 to 360 million people suffer from major depressive disorders with 18 million represented in the United States.[84] According to the National Institute of Mental Health (NIMH), 12 million US women yearly are affected by depressive disorders.[84] It has been estimated one in 33 children and one in eight adolescents have been diagnosed with depressive disorders and most likely

numerous cases go undetected.[84] Studies have demonstrated depression occurring twice as frequently in women than in men, and 25% of all women sometime during their life will suffer from a major depressive disorder.[85]

No single cause of depression has been identified; however, studies indicate combinations of factors are likely to exist. Since women are being diagnosed more than men, research is currently exploring factors associated with their increased risk for depression. Social, genetic, hormonal, biological and chemical factors unique to women are being examined as potential links to depression.[84]

Depressive illnesses have been characterized as brain disorders; magnetic resonance imaging (MRI) has demonstrated brain matter in those with depression appear differently than in those where no depression has occurred.[84] Neurotransmitters, chemicals used for brain cell communication appear unbalanced as well as mood and appetite regulators seem to improperly function in the brains with depressive illnesses.[84]

Depressive episodes can last several months or up to one year depending on the individual's family support system and access to treatment. Depression has been shown to influence subsequent episodes. Recurrent episodes can vary among women and years may lapse between occurrences; however, as women age the frequency of episodes tends to increase.[86] Studies have indicated at least 60% of those suffering their first depressive episode will typically encounter a second and those experiencing two episodes will have a 70% chance to suffer a third.[86] Five to ten percent of those with a single depressive episode will develop manic disorders, changing their initial diagnosis to a bipolar disorder.[86]

In some individuals, depressive disorders can start as young as 15 years of age. This early onset has been associated with family histories of mood disorders. An early onset in women has been associated with low self-esteem and poor school grades.[84] Such patterns of depression are being classified as progressive and lifelong challenges.[86]

Data extrapolated from remission studies one-year post diagnosis reported only 40% of individuals achieve partial remission, 30% achieve full remission, and 30% were resistant to treatment. Unfortunately, evidence is showing more women than men not seeking treatment for their depression, even though in severe depressive conditions, women have shown some improvement from treatment measures.[84]

Risk Factors

Coexistence with Illnesses & Other Conditions

Unfortunately, depression can be misdiagnosed, under treated, misunderstood and overshadowed by medical complexities. Illnesses, especially in women, often co-exist with depression. They may precede or follow depression, or even be identified as the cause or consequence.[84] Depression often coexists with medical conditions such as stroke, heart disease, diabetes, cancer, HIV/AIDS, Parkinson's disease, and multiple sclerosis; often worsening symptoms of the illness.[87] Studies have indicated those suffering from depression in addition to serious medical conditions exhibit increased symptoms from each illness.[88] Adapting to medical conditions becomes a greater challenge for those suffering from depression; proper treatment for depression and coexisting medical condition(s) can alleviate burdens associated from each.[88]

Especially among women, depression has been diagnosed in those with eating disorders, bulimia nervosa and anorexia nervosa. Post-traumatic stress disorders (PTSD), panic disorders, obsessive-compulsive disorders (OCD) and anxiety disorders often coexist with depression.[89] Women are more prone to depression after encountering a PTSD, and Kessler and colleagues[89] report more women than men experience these coexisting disorders.

Other Risk Factors

Family histories of depression may place a woman at greater risk for developing disorders; however, depression can also exist in women where no genetic links have been identified.[90] Those with relatives suffering from major depressive illnesses are likely to have a 1.5 to 3.0 times greater chance of developing

depression than the general census.[86] A large genome-wide association study genetic and health records of 1.2 million people identified 178 gene variants linked to major depression, a disorder that will affect as many as one in every five people during their lifetimes.[90] Children in households with adults suffering depressive disorders represent an increased risk of attention-deficit/ hyperactivity disorders (ADHD) or anxiety disorders.[90]

Past physical, sexual, or emotional abuse has been associated with depression later in life among people who may be biologically predisposed to depression.[94] Any history of domestic violence, abuse, victim of incest or the loss of a parent during childhood can influence depression in later years.[86]

Women are more likely to suffer from psychosocial stressors than men; increasing their likelihood for depression.[94] Stress encountered from work, family or marital relationships has triggered depressive episodes, as well as divorce, death and personal trauma. Caring for aging parents and children along with additional household or work responsibilities can create stressful situations eliciting depression. It has been reported women respond differently to stressful events than men, and for unknown reasons their prolonged responses to the stress actually place them at higher risk for depression than men.[94] Studies have provided no explanation as to why some women faced with similar challenges experience no depressive disorders.

Hormonal factors unique to women have been researched as probable risks linking women to higher rates of depression. Since hormones directly affect the brain's ability to control moods and emotions, scientists have examined the influence of hormones during specific times in a woman's lifecycle; puberty, menses, pregnancy, postpartum, pre and post-menopause.[94] One week prior to menstruation, anxiety, mood swings, irritability and depression have each been observed in women suffering from a severe type of premenstrual syndrome known as premenstrual dysphoric disorder (PMDD).[95]

Those debilitated with PMDD exhibit different responses to hormonal changes; demonstrating greater sensitivity possibly linked to histories of mood disorders, or unidentified differences in brain chemistry. Researchers are currently examining the cyclical periods of estrogen affecting the brain that potentially have associations with depression.[96]

Postpartum depression is common for many women. From the numerous physical and hormonal changes occurring during and after pregnancy, episodes of depression can exist. While for many they will be temporary, other women may suffer serious conditions requiring emotional support and therapy. Munk and colleagues[97] have noted an increased risk for mental disorders to occur and last several months postpartum. Others have suggested women suffering postpartum depression possibly suffered depression during pregnancy which was undiagnosed. Studies have concluded with recommendations indicating women should be screened for depression during pregnancy as well as during the postpartum period.[92,93] The U.S. Food and Drug Administration approved a drug March 20, 2019 specifically meant to treat postpartum depression. It is an intravenous infusion of the drug brexanolone, sold as Zulresso. In two placebo-controlled studies, Zulresso demonstrated superiority to placebo in improvement of depressive symptoms at the end of the first infusion. The improvement in depression was also observed at the end of the 30-day follow-up period.[98]

Depression has not been associated with the normal aging process; however, evidence suggests older women experience more depression than older men; even though rates decrease in women after menopause.[99] The transitioning phases between pre-menopause and menopause indicate fluctuations in hormonal changes; mood changes may not be experienced by all women, while others may demonstrate increased risks for depression. These depressive illnesses have been noted without prior histories[100,101] while other studies have shown depression in post-menopausal women occurring in those with prior histories of depressive disorders. Older women tend

not to express or discuss feelings of sadness and demonstrate less than obvious symptoms resulting in physicians being less likely to diagnose a depressive disorder.[85]

Types of Depressive Disorders

There are many classifications of depression and major depressive disorders along with dysthymic disorders are the most commonly identified.[102]

- Major depressive disorders are also known as major depression; collectively symptoms impact one's ability to function, work, and enjoy life. This type of depression becomes disabling; it may occur only once or recur throughout a lifespan.[102]
- Dysthymic disorders are typically characterized as lasting two or more years; altering normal functioning, yet not totally creating disability. Episodes involving major depression tend to occur often during a lifetime.[102]

Other characteristics of depression are classified as:

- Postpartum depression can be diagnosed one month after a new mother delivers a baby.[102] Altshuler and colleagues[101] report 10-15% of women suffer with this depressive episode after delivery.
- Psychotic depression represents a form of psychosis; delusions and hallucinations usually coexist with severe depression.[102]
- Seasonal affective disorder (SAD) can be characterized by depression experienced during the winter season. Oftentimes, light therapy is used in combination with antidepressant medications and psychotherapy to reduce SAD symptoms.[103]
- Bipolar disorders are also known as manic-depressive illnesses and appear not as common as major depressive disorders. They are characterized by mood swings with extreme highs known as mania to very extreme lows classified as depression.[102]

Signs & Symptoms

A loss of interest in almost all activities, daily and consecutively for two weeks is a strong sign of a major depressive disorder. Persistent aches and pains that do not change even after treatment are often described by older women rather than sadness.[86] Often, the individual's demeanor, facial expressions and anxious feelings are used to describe behavioral characteristics observed in depression.[86] Not all express or experience similar symptoms; with each sex/gender the frequency, severity and duration of signs and symptoms will vary based on individual types of disorders (Table 5).

Symptoms may include:[102]

- Overeating, or loss of appetite
- Insomnia, or excessive sleeping
- Fatigue and decreased energy
- Feelings of guilt, hopelessness, worthlessness
- Restlessness, irritability
- Persistent sadness, empty feelings
- Feelings of anxiety
- Loss of interest in hobbies and activities
- Difficulty concentrating, making decisions, remembering details
- Thoughts of suicide

Table 5. Symptoms of Major Depressive Disorder.

Additional signs and symptoms may include: psychosomatic complaints with increased visits to medical doctors; difficulty in maintaining personal relationships; phobias; frequent change and/or loss of employment; and addictive behaviors to substance abuse and gambling. Suicide attempts and family histories of completed suicides represent severe symptoms requiring immediate medical attention. When impairments are so significant that normal functioning is halted, specialized psychotherapy must be initiated.[86]

Treatments

Assessments

Severe cases of depressive illnesses can be treated and the earlier the treatment, the greater the success and less likely a chance for recurrence. The first and most important step is to seek medical care. Emergency room doctors can assist with temporary care and further advise where to seek additional treatment. Psychiatrists, social workers, psychologists, community mental health centers, hospital outpatient psychiatry centers, state hospital outpatient clinics, private clinics, local medical and psychiatric societies can each assist in

offering care and guidance towards the appropriate treatment based on individual needs.[102]

Consulting a physician is necessary in ruling out potential thyroid conditions, viral infections or previously treated medical conditions creating depressive adverse reactions. Laboratory testing and physical examinations are necessary along with psychological evaluations to determine history of symptoms, duration, severity, alcohol or substance use, thoughts of suicide and/or death.[102] Once an individual is diagnosed, treatment methods such as psychotherapy and medications are typically introduced.

Psychotherapy

When mild to moderate depression is diagnosed, psychotherapy has demonstrated successful treatment regimens consisting of short-term (10-20 weeks) cognitive-behavioral therapy (CBT) and/or interpersonal therapy (IPT) based on individual needs. CBT assists in altering behaviors and negative thoughts that potentially contribute towards depression, while IPT focuses on working out difficult relationships triggering depressive symptoms.[102] Alternative therapies often recommend a positive state of well-being emphasizing good nutrition, exercise, social support groups, and the avoidance of drugs, cigarettes, and alcohol use are strongly encouraged.[103] Studies have shown the combination of psychotherapy and medications to be effective treatment approaches in treating older adults, with results indicating less recurrences after two years of combination treatment.[104]

Medications/Prescription Trends

The use of antidepressant medications has demonstrated success in working to calm neurotransmitters (brain chemicals such as norepinephrine and serotonin), while other antidepressant medications focus on dopamine, which is responsible for controlling mood instabilities. Combined treatment of psychotherapy and medication is the usual and preferred treatment of choice for depression.[105]

While antidepressants have been shown to be helpful, there is some concern they are being overused. In a US population-based survey study held between 2005 and 2014, the estimated overall prevalence of US adults using medications with depression as a potential adverse effect was 37.2%.[106] Use of multiple medications was associated with greater likelihood of concurrent depression.[106] The number of antidepressants prescribed to patients in England has doubled in a decade, official figures show.[107]

In a 2002 survey conducted in France, it was reported 3.5% of the people had been prescribed antidepressants, in comparison to a 1.7% prescription rate in a 1992 finding. The results further indicated the antidepressants were not being used for depressive disorder symptoms, and the prescriptions were not in accordance with specific guidelines identified to treat depressive illnesses.[108] In British Columbia during 1996–2004, the use of antidepressants increased from 3.4% to 7.2%.[109] In the Netherlands during 1992–2001, an increased rate of prescriptions for antidepressants was recorded along with increased periods of treatment necessary to treat depressive illnesses.[110]

The Organization for Economic Cooperation and Development (OECD) looked at antidepressant use in 25 countries and found that in every single country reviewed by the OECD, antidepressant use was on the rise.[111]

According to the National Institute of Mental Health, the most popular antidepressants are called selective serotonin reuptake inhibitors, or SSRIs. Other widely prescribed antidepressants are serotonin and norepinephrine reuptake inhibitors, or SNRIs. Bupropion, a third type of antidepressant, is also used to treat seasonal affective disorder (and to help with smoking cessation).[112]

To fully understand how antidepressants work and the specific classifications of each is significant when trying to avoid side effects, negative interactions from other prescriptions, over-the-counter medications, herbal

nutriceuticals, and nicotine replacements. The awareness of coexisting medical conditions, recognition of clinical signs and symptoms, and a history of any depressive disorders and/or treatments aide in determining the best antidepressant based on the individual's disorder.[113] Regarding St. John's wort, a botanical product used widely to treat depression, be aware that the FDA has not approved its use as an over-the-counter or prescription medicine for depression. There are concerns about its safety, and it should not be combined with a prescription antidepressant.[113]

There are numerous classifications of antidepressant medications with the latest and most commonly used antidepressants falling into two classifications: selective serotonin reuptake inhibitors (SSRI) and serotonin and norephinephrine reuptake inhibitors (SNRI).[112] SSRIs include: fluoxetine (Prozac); citalopram (Celexa); sertraline (Zoloft); paroxetine (Paxil); and escitalopram (Lexapro). Examples of SNRIs are venlafaxine (Effexor) and duloxetine (Cymbalta).[112]

Fewer side effects have been reported from SSRIs and SNRIs than tricyclics and tetracyclics, older classifications of antidepressants such as (Elavil) and (Pamelor) and monoamine oxidase inhibitors (MAOI) such as (Nardil) and (Marphan). Not all medications will prove effective and some may produce intolerable side effects; consequently, physicians will alter between categories of antidepressants, or prescribe antipsychotic medications that potentially improve the efficacy of the antidepressant.[112]

Those taking MAOIs require a thorough understanding of the medication's ability to interact negatively with certain foods; particularly the chemical tyramine, found in wines, pickles and many cheeses, and over-the-counter (OTC) medications such as decongestants.[114] For example, Wellbutrin, a commonly prescribed antidepressant used to treat SAD symptoms, should not be taken while using Zyban or other nicotine replacement alternatives intended for use in smoking cessation protocols. Wellbutrin is not advised for those with eating disorders or in combination with a MAOI;[114] negative interactions can increase blood pressure and potential stroke conditions can develop.[116]

It is vitally important that all health care professionals understand the potentially fatal interactions between antidepressants and prescription medications. The Food and Drug Administration (FDA) in 2005 established "black box" warning labels on all antidepressant medications; alerting patients and health care professionals to the increased risk of suicide and suicidal attempts in children and adolescents taking such medications. The FDA in 2007 extended the "black box" warning to include young adults through age 24. The "black box" warning represents the gravest of warnings on any prescription labeling. Close monitoring is necessary for those patients taking antidepressants; any unusual behaviors, worsening depression or suicidal behaviors should be reported to their physician immediately.[117]

Oral Connections

Patients suffering with depressive symptoms and undergoing specialized treatments require detailed oral hygiene care. Oftentimes, their depression may have led them to consume non-nutritious diets consisting of highly cariogenic drinks, snacks, and retentive fermentable carbohydrates, all contributing factors for dental caries. Dietary inadequacies have been associated with depressive mood disorders.118 Preventive dietary care is certainly recommended along with specialized oral hygiene instructions. Medications used to treat depression often create xerostomia; additional oral manifestations such as burning mouth syndrome and candidiasis119 can potentially develop, requiring detailed home care measures. Xerostomia can intensify gingival, periodontal and caries progression requiring specialized home care products tailored to address specific needs. Signs and symptoms consistent with depressive disorders typically display low motivation for self-care or total rejection of any health interest. Sensitive care and stress-free appointments are suggested when treating these individuals in order to respect their well-being and emotional status. Any abnormal behavior, distraught or angry feelings should be shared with their care provider immediately.

COVID-19

This article would not be complete if it did not mention the pandemic of COVID-19. The pandemic disrupted the country, and indeed the work since late 2019. The good news is that, as of this writing, COVID-19 deaths are down 95 percent this year, according to the World Health Organization (WHO).[135] However, the virus is still alive and well. While the pandemic may be behind us, it has become endemic, and some people are dealing with Long COVID.[136]

In late 2019, a disease was becoming prevalent in Wuhan, China. The symptoms were typical of pneumonia but did not respond to conventional treatments. The World Health Organization (WHO) labeled the disease "2019 Novel Coronavirus" or "2019-nCoV" to denote the disease causing the outbreak in Wuhan, China.[137] Vaccines were created for the original virus and its subsequent variants, such as alpha, gamma, and omicron. Travel was severely limited, and by February 18, 2021, approximately 2.5 million women and 1.8 million men left the workforce since the initiation of the pandemic in the U.S.[137] On March 11, 2020 the WHO declared COVID-19 a pandemic. "Globally, as of 12:37am CEST, 26 April 2023, there have been 764,474,387 confirmed cases of COVID-19, including 6,915,286 deaths, reported to WHO. As of 24 April 2023, a total of 13,325,228,015 vaccine doses have been administered.[138] The U.S. Department of Health and Human Services (HHS) announced Guidance in June 2020 that specifies the type of data must be reported to HHS by laboratories along with Coronavirus Disease 2019 (COVID-19) test results, such as demographic data on race, ethnicity, age, and sex.[139] To better understand the effects of the pandemic health on women, we should reflect on the distinctive health risks and outcomes influenced by sex and gender. For example, women have higher rates of obesity in comparison to men in most countries, but the extent of the difference varies greatly.[140] Women also have more severe obesity than men, which increases their risk of type 2 diabetes. Women have more comorbidities compared to men.[141] The six possible chronic conditions are arthritis, current asthma, cancer, cardiovascular disease, chronic obstructive pulmonary disease, and diabetes. Across each age group, women have a higher probability than men to have one or more chronic conditions. Women live longer with more chronic health conditions.[142]

It is no surprise that the COVID-19 pandemic has had greater negative effects on women versus men in some areas, as women are often caregivers for others. Also, more women than men are jobless owing to the effect of the coronavirus crisis.[143] An estimate is that women's job loss rates due to COVID-19 are about 1.8 times higher than male job loss rates globally, at 5.7 percent versus 3.1 percent respectively. In the healthcare arena, we saw women foregoing many preventive and therapeutic medical appointments, such as screenings.[144] The study reported that the total number of cancer screenings declined by an average of 87% for breast cancer and 84% for cervical cancer during early 2020 due to the COVID-19 pandemic. This can result in late diagnoses and worse health outcomes.

Many women were pregnant or breast feeding during the pandemic. Many were confused as to how the virus or the vaccine might affect themselves of their unborn babies. On August 11, 2021, CDC released a statement stating that the COVID-19 vaccination is safe for pregnant and breastfeeding women. Studies performed by the CDC found that becoming infected with COVID-19 during pregnancy increases the risk of developing severe illness and pregnancy complications, and that there is no evidence that any vaccines, including the COVID-19 vaccines, cause fertility problems in women or men.[145] There was no increased risk of miscarriage among nearly 2,500 pregnant women who received an mRNA COVID-19 vaccine before 20 weeks of pregnancy. Miscarriage typically occurs in about 11-16% of pregnancies, and this study found miscarriage rates after receiving a COVID-19 vaccine were approximately 13%, comparable to the expected rate of miscarriage in the general population.[146] On September 29, 2021 CDC issued an urgent health advisory for pregnant and lactating women to obtain a COVID-19 vaccine.[147] The benefits of the vaccine outweigh the risks on contracting the virus during pregnancy, and it has been proven to be safe.

In March of 2021, a survey reported that 51% of women versus 34% of men said that worry or stress related to the pandemic has affected their mental health, and they were more likely to have not sought or received health care during the pandemic compared to men.[148] In fact, a woman's risk for depression during pregnancy doubled during the COVID-19 pandemic.[149]

So how does COVID-19 affect cardiovascular and heart health? A study released on April 26, 2023 implies that even mild COVID-19 can have harmful effects on cardiovascular health.[150] The study compared pre and post COVID-infection levels of arterial stiffness, which has been known to be an indicator linked with the aging and function of arteries. This normally took place two to three months after the illness. One of the study authors hypothesized that the COVID-19 infection prompted the auto-immune process that leads to vasculature deterioration. In another study, researchers reported that women with high job strain, high stressful life events and high social strain were considerably linked with a higher risk of having a heart attack for the first time.[151] This conclusion was made after observing over 80,000 women in the U.S. and found a 21% increase in risk of having a heart attack.[151] A Canadian study looked at societal connections and found that they are more strongly associated with hypertension in middle and older aged women than men.[152] Women without husbands or partners, or those who have limited social activities, are at risk for having hypertension. We need to take social factors into consideration in addressing risk for hypertension and cardiovascular disease prevention. The pandemic caused isolation and loneliness, and the health risks are as deadly as smoking a dozen cigarettes daily, costing the health industry billions of dollars annually.[153] Social connection is essential to our health and well being.[154] In fact, loneliness and isolation has become epidemic.[155]

And lastly, we will review the effect the COVID-19 pandemic had on oral health care workers. As you can imagine, due to the risk of being infected, the additional precautions that need to be followed, and the extra time it took to treat patients, the pandemic "caused fatigue, frustration and emotional exhaustion among healthcare workers".[156] The report assessed the impact of COVID-19 on considerations such as health, well-being, accessibility and the working environments of oral health care professionals. The authors believe the results will help to prepare for any future healthcare crises, and government and others responses to them.[157]

As the COVID-19 pandemic enters its 4th year, WHO has changed its recommendations for surveillance and has updated its Strategic Preparedness and Response plan for 2023-2025. The focus has shifted country's critical emergency response actions, to farseeing-term and sustained COVID-19 disease prevention, control and management.[158]

As oral health care professionals, we strive to help our patients maintain optimal oral health and general health. We must be aware of the science that affects health, and that it is constantly changing. Resources are available to keep us current with the research that affects our patients, and subsequently our care. Geriatric and sex-specific research is more abundant as the population ages and our body of knowledge regarding sex and gender differences in illness and treatment increases. As clinicians and researchers, it is vital that we reflect on sex and gender in our approach to diagnosis, prevention, and treatment of diseases.

Final Thoughts and Home Care Recommendations

The preceding sections of this course have highlighted research related to women and stroke, rheumatoid arthritis and depression. Women have shown disproportionate outcomes from medical conditions in measures of prevention, diagnosis, prevalence, incidence as well as response to treatments. Their culture, education, and most importantly access to care have placed female populations worldwide at potential risk for adverse disease outcomes.

Oral risk assessments, screening, education, referrals and treatment planning are essential components necessary for comprehensive oral healthcare; providing oral healthcare professionals the opportunity

to identify early stages of disease, determine patient acceptance, and tailor oral care recommendations based on need. The oral healthcare professional can directly influence the patients' oral health status, educate them about systemic relationships linked to oral health concerns, and help them embrace whole body health.

Educational materials for patient information and videos are available from numerous organizations. The American Dental Association (ADA) and the American Dental Hygienists' Association (ADHA) have online patient information (*www.ada.org*) and *www.dentalcare.com* provides the latest up-to-date customized patient education available for print in 6 languages.

Home care regimens including specialized products to improve gingival and periodontal health are particularly significant when treating these patients. Oral healthcare professionals should consider the complex needs reported in relationships to prevalence when recommending home care products for these conditions.

Products to enhance mechanical plaque removal are fundamental to a good oral hygiene regimen. The oscillating-rotating power toothbrush technology has demonstrated increased efficacy in plaque removal over manual brushes.[120,121] Also tools exist that offer compliance-enhancing features such as timers, multiple brushing modes, and visual pressure sensor indicators which help motivate patients to brush with good technique. According to the Cochrane Database of Systematic Reviews 2010, "brushes with a rotation oscillation action reduced plaque and gingivitis more than those with a side-to-side action in the (4-12 weeks)." The systematic review further detailed 398 studies compared power technologies to each other, and 17 trials including 1369 subjects meeting selection criteria were evaluated. Seven studies compared the rotating oscillation action and side-to-side (sonic action) technologies. The outcome stated in the Cochrane review provides evidence that when independent, highly regarded third parties evaluate performance, the oscillating-rotating power toothbrush technology was consistently top ranked.[122]

Flossing and interproximal aides are additional home care methods necessary to mechanically remove plaque; each removing plaque biofilm below the gingival margin along with the interproximal regions. Patients have opportunities to select from numerous interproximal brushes, varieties of floss, floss picks, floss holders and oral irrigators allowing ease and compliance in accomplishing necessary interdental care.

Recently a small study was presented that compared the effectiveness of an oral irrigator (water flosser) and interdental brush on bleeding indices and gingival abrasion. The oral irrigator was shown to be significantly more effective than the interdental brush for improving gingival health in this clinical study.[132]

In addition to toothbrushes and oral irrigators, there are also interdental brushes. As an adjunct to brushing, the interdental brushes were shown to remove more dental plaque than brushing alone.[133] All three studies in this systematic review that compared interdental brushes as an adjunct to brushing showed a significant difference in favor of the use of interdental brushes for plaque removal. The majority of the studies showed a positive significant difference on the plaque index when using interdental brushes compared with floss. No differences were found for the gingival or bleeding indices. Meta-analysis showed superiority of the interdental brush to floss with respect to plaque removal.[133]

Chemotherapeutic dentifrices and rinses help inhibit plaque biofilm and are important home care products that should be recommended based on individual patient needs. Dentifrices, containing active ingredients such as stannous fluoride or triclosan are used to inhibit plaque regrowth between brushings, reduce gingival inflammation and bleeding. A significant difference between the two ingredients found in over-the-counter dentifrices is that only stannous fluoride additionally offers protection from sensitivity[123,124] as well as caries and gingival health benefits.[108] When

recommending a stannous fluoride dentifrice, it is important the product contain stabilized stannous fluoride (Crest® PRO-HEALTH™), which provides greater product efficacy than unstabilized formulations.[126,127] An advanced regimen including (Crest® PRO-HEALTH® Clinical Gum Protection™), a dentifrice demonstrating reduced gingival inflammation, bleeding and plaque along with daily use from an oscillating-rotating toothbrush and floss provides strong evidence that it is beneficial in addressing the necessary components for optimum gingival health.[128] Parodontax™ contains 0.454% stannous fluoride formulation kills bacteria and reduces carbohydrate metabolism, inhibiting bacterial growth and loosening the structural integrity of the biofilm. Additionally, sustained bacterial actions have been demonstrated by stannous fluoride containing dentifrices with hexametaphosphate. Other stannous fluoride formulas exist with similar benefits (Colgate Total SF).[134]

Whether rinses are prescription or over-the-counter versions, they can serve as effective and successful adjuncts to patients' daily hygiene routines. Chlorhexidine rinses have been viewed as the gold standard due to their substantivity and efficacy (and now it is available in an alcohol-free formula); however, these rinses are limited to a short-term use due to some extrinsic staining and patient compliance concerns. Over-the-counter options include chemotherapeutic rinses with cetylpyridinium chloride (CPC), a broad-spectrum antimicrobial agent available in an alcohol-free formula. Alcohol-free formulas are recognized as providing pleasurable rinsing experiences; especially ideal for those patients already experiencing xerostomia and/or oral manifestations induced from medications, necessary for treating a myriad of medical conditions. Essential oils rinses are also over-the-counter, and may or may not contain alcohol. While alcohol in oral rinses are not harmful, there are some that prefer alcohol-free formulations. It is important to know that research findings have indicated CPC and essential oils rinses when formulated properly have demonstrated significant and comparable reductions in plaque and gingivitis.[129,130] In-office or take-home fluoride products are available to treat those patients requiring additional fluoride assistance, such as the aging population experiencing an increased rate of root caries. It has been estimated that about one-fifth of the aging patients report xerostomia, increasing their risk for plaque, gingivitis, and caries, due to a lower oral pH.[131] Various forms of specialized rinses, dentifrices, liquid moisturizers, salivary stimulants, sugar-free chewing gum are marketed to assist with symptoms and protect against xerostomic conditions.

Each day oral health care professionals are challenged to provide the best treatment and home care recommendations to assist patients in achieving optimal oral health. Resources currently available with valid and credible research findings can assist oral health care professionals to better understand the oral-systemic relationships challenging worldwide populations. Aging and sex/gender-specific concerns represent unique health concerns requiring specialized care and awareness. As we better understand this plethora of information before us, we will continue to address the ever challenging needs facing our patients, recommend the latest evidence-based technology, and we too will evolve just as the research unfolds additional oral discoveries and causal relationships in the systemic diseases impacting our oral health and whole body wellness.

Course Test Preview

To receive Continuing Education credit for this course, you must complete the online test. Please go to: *www.dentalcare.com/en-us/ce-courses/ce330/test*

1. The latest and most commonly used classifications of antidepressant medications are _____.

A. Serotonin norephinephrine reuptake inhibitors (SNRI)
B. Tetracyclics and tricyclics
C. Beta blockers
D. Biological Response Modifiers

2. In 2006, three SSRI antidepressant medications were listed as the most commonly prescribed medications used in the US for treating depression. They were _____.

A. Zoloft, Cymbalta and Lexapro
B. Zoloft, Lexapro and Prozac
C. Zoloft, Effexor and Prozac
D. Zoloft, Paxil and Effexor

3. The single cause for depression demonstrated in women has been identified as _____.

A. hormonal
B. smoking
C. genetic
D. Not one single cause, possible combinations of factors.

4. The following categories of medications have been used to treat rheumatoid arthritis, except one, what is the EXCEPTION?

A. Immunosuppressants
B. Steroids
C. Biological response modifiers
D. Angiotensin-converting enzyme (ACE) Inhibitors

5. Stroke and heart attack share similar risk factors, except one, what is the EXCEPTION?

A. Obesity
B. Diabetes
C. Physical inactivity
D. Low triglyceride levels

6. A specific antibody can be identified from immunological testing in most patients that fully confirms the presence of rheumatoid arthritis in the body?

A. True
B. False

7. Numerous factors (hormonal, genetic and environmental) have been speculated as risk factors affecting the body's immune system attacking multiple joints and placing one at risk for rheumatoid arthritis.

A. True
B. False

8. According to the American Heart Association, women should maintain total cholesterol below 200 mg/dL and HDL levels should be above 50 mg/dL and the LDL levels and triglyceride levels should be _____.

A. LDL levels at 175 mg/dL and triglycerides at 200 mg/dL
B. LDL levels at 150 mg/dL and triglycerides at 150 mg/dL
C. LDL levels below 100 mg/dL and triglycerides below 150 mg/dL
D. LDL levels above 125 mg/dL and triglycerides above 150 mg/dL

9. The Office of Women's Health at the Centers for Disease Control and Prevention identifies stroke as the 2nd leading cause of death among American women, behind cancer deaths?

A. True
B. False

10. All of the following are modifiable risk factors for stroke except one, what is the EXCEPTION?

A. Physical inactivity
B. Elevated triglyceride levels
C. Personal history of stroke
D. Smoking when combined with oral contraceptives

11. Which is NOT included as part of the criteria that the American College of Rheumatology uses to classify rheumatoid arthritis?

A. Joint Involvement
B. Serology
C. Acute-Phase Reactants
D. Duration of Symptoms
E. Family History of RA

12. To understand the effects of a stroke, it is important to first understand the location of damage in the brain.

A. True
B. False

13. All the following statements are true EXCEPT:

A. Oscillating-rotating power toothbrushes have demonstrated increased efficacy in plaque removal over manual brushes.
B. Some power brush models offer timers and pressure sensors.
C. Interproximal floss aids can reduce compliance.
D. Flossing helps remove plaque below the gumline.

14. The active ingredient available in an alcohol-free over-the-counter chemotherapeutic rinse for the treatment of plaque-induced gingivitis is _____.

A. baking soda
B. essential oils
C. cetylpyridinium chloride
D. chlorhexidine

15. The cure for rheumatoid arthritis involves a series of complex medications, physical therapy and surgery to correct the joint deformity.

A. True
B. False

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Additional Resources

- No Additional Resources

About the Authors

Maria Goldie, RDH, MS

Maria graduated from the University of Pennsylvania, School of Dental Hygiene & is the recipient of the 1999 University of Pennsylvania Dental Hygiene Alumni Achievement Award. She is also a 2003 winner of the Pfizer/ADHA Award for Excellence in Dental Hygiene and the 2011 Alfred C. Fones Award. She was awarded the first ever "2016 Distinction in Service Award" from the International Federation of Dental Hygienists in June, 2016 Presidential Citation in 2018 from ADHA. She earned her BA in Health Services Administration from Saint Mary's College and a MS in Health Science from San Francisco State University. Maria is a graduate of the 2004-2006 fellowship of the California Health Care Foundation's (CHCF) Health Care Leadership Program, administered by the Center for Health Professions at the University of California, San Francisco, a two-year program. She is the owner of Seminars for Women's Health and Sex Based Medicine, whose goal is to educate professionals about the differences in health and disease between men and women, communication styles, and the link between oral and general health.

As a noted researcher, author, and speaker, Maria has presented seminars nationally and internationally on topics such as Women's Health and Wellness, Cancers and Oral Care for the Cancer Patient, Oral Cancer, Enamel Therapy, and Immunology and Periodontal Disease. Maria was a member of the National Advisory Committee for the Robert Wood Johnson Foundation's Smoking Cessation Leadership Center. She conducted research with the late Dr. Margaret Walsh on smokeless tobacco at the University of California, San Francisco.

Maria is co-editor of the textbook: Dental Hygiene – Applications to Clinical Practice. Maria is co-founder of the International Dental Hygiene Educator's Forum (IDHEF), the fifth meeting to be held in Australia in 2019. Maria served as the 1997-98 President of the American Dental Hygienists' Association (ADHA), served on an advisory panel to develop "The Future of Dental Hygiene Report", and was the President of the International Federation of Dental Hygienists (IFDH) 2010-2013.

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Pam Hughes, RDH, MS

The P&G team wishes to express its sadness over the loss of our colleague and friend, Ms. Pam Hughes, on December 14, 2017. She was a dedicated, passionate dental hygiene educator and clinician who touched so many lives through her teaching and patient care. We will miss her.

Pam was a recognized speaker throughout the United States on advances in therapeutic oral care products, women's aging complexities, oral risk assessment and improving patient care with evidence-based decision making. She was a past President of the California Dental Hygiene Educators' Association and the California Dental Hygienists' Association.

Pam was clinically active in a general practice with over 37 years of experience and held a faculty position in the BSDH and MSDH graduate program at the Ostrow School of Dentistry of University of Southern California in the Division of Periodontology, Diagnostic Sciences and Dental Hygiene. Pam was the recipient of the 2016 Most Outstanding Part-time Faculty award and the 2017 Excellence in Teaching Award.