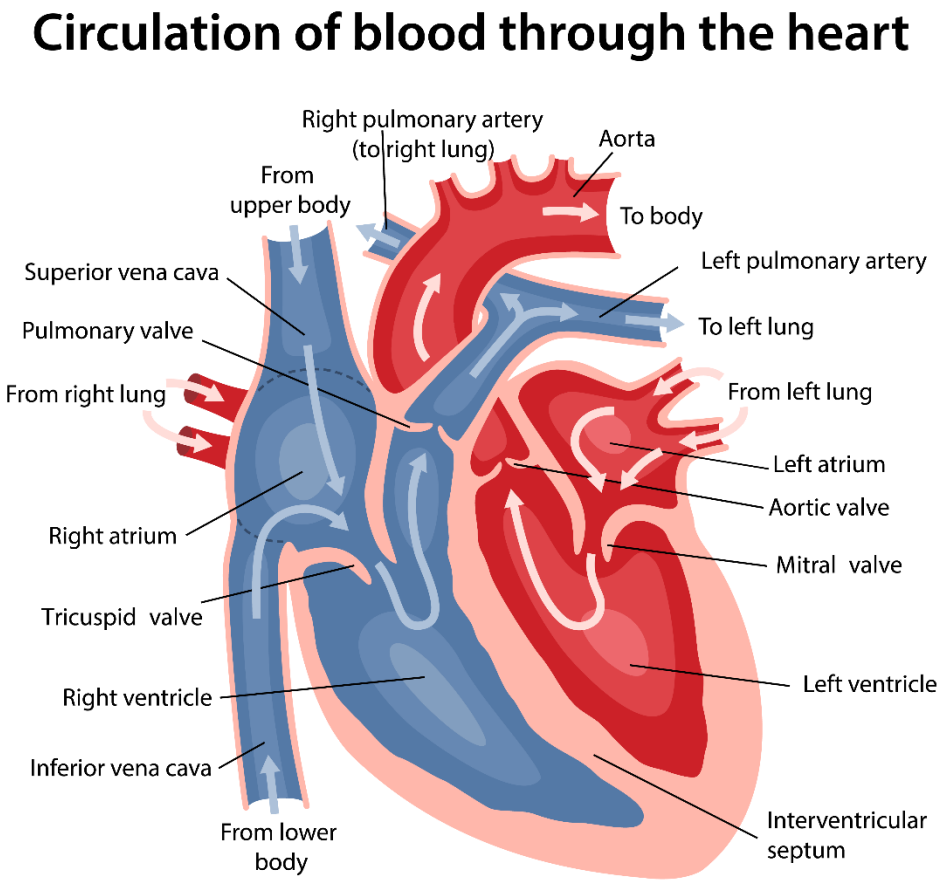
Episode 80 – Cardiovascular Disease – Part 2: Types of Disorders

March 17, 2023

Types of cardiovascular disease

There are many types of cardiovascular disease (CVD), such as coronary artery disease, heart failure, cerebrovascular disease, hypertensive heart disease, peripheral arterial disease, arrhythmia, rheumatic heart disease, valvular heart disease, inflammatory heart diseases, congenital heart disease, and cardiomyopathy. There are also several tests and procedures to diagnose and treat CVD.[1]



[1] Refer to Episode 79 for detailed information on CVD diagnostic tests and treatment strategies.

Cardiovascular disease

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
Coronary artery disease (ischemic heart disease, coronary heart disease) [1] [2] [3]	Disease of the coronary arteries where the arteries are narrowed or blocked from plaque buildup (atherosclerosis).	Narrow or blocked coronary arteries reduce blood flow to the heart, which can lead to angina, myocardial infarction (MI), heart failure, or death.	Depends on the condition.	Depends on type and severity, and may include lifestyle changes, medications, surgery, and other procedures.
Atherosclerosis [4] [5] [6] [7] [8] [9]	Buildup of plaque or atheroma (fatty deposits) in artery walls, which narrows arteries and obstructs blood flow. Type of arteriosclerosis, which is sclerosis (hardening) of the arteries where arteries become thick, stiff, less elastic. Plaque (atheroma) is made up of cholesterol, fat, cellular waste products, calcium, and fibrin (clotting material in the blood). Plaques grow, damage lining of the artery, and can rupture. A blood clot (thrombus) forms in response to the rupture, further narrowing or occluding the artery. The thrombus may break loose and travel to another location (i.e., embolus).[2] A thrombus or embolus can partly or completed block blood flow, which	Usually asymptomatic until artery is blocked by at least half. Signs and symptoms depend on severity and arteries affected. For example, blocked: • Coronary arteries may cause angina or MI symptoms. • Carotid arteries may cause stroke symptoms. • Arteries of arms/legs may cause peripheral artery disease symptoms (e.g., pain when walking [claudication]). • Renal arteries to kidneys may cause hypertension or kidney failure.	Tests may include: • Physical exam • Blood tests (e.g., glucose, cholesterol levels, C-reactive protein [CRP]) • Electrocardiogram (ECG / EKG) • Exercise stress test • Echocardiogram (may be combined with exercise stress test) • Doppler ultrasound • Ankle-brachial index (ABI) compares blood pressure in the ankle with blood pressure in the arm. • Cardiac catheterization and angiogram • Coronary calcium scan • Nuclear stress test	**Lifestyle changes** (e.g., healthy diet, exercising) may be all that is needed to treat atherosclerosis. Sometimes, medication or surgical procedures are required. **Medications** may include: • Statins and other cholesterol drugs to lower low-density lipoprotein (LDL) to help slow, stop, or even reverse buildup of fatty deposits in arteries. • Angiotensin-converting enzyme (ACE) inhibitors and beta blockers to help lower blood pressure and lower the heart's workload. Drugs to lower blood pressure do not reverse atherosclerosis. • Calcium channel blockers. • Anticoagulants or antiplatelets, such as aspirin. Daily low-dose aspirin therapy may be recommended for the primary prevention of MI or stroke in only certain individuals. Daily aspirin can have serious side effects, including bleeding in the

[2] An embolus is a blood clot or other substance (e.g., atheroma, cancer cells, etc.) that has travelled.

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
	can trigger MI or stroke. Blockage of a blood vessel by an embolus is called an embolism.		• Cardiac magnetic resonance imaging (MRI)	stomach and intestines and should only be taken on advice of a medical provider. • Medications to control other health conditions (e.g., diabetes) that raise risk of atherosclerosis or to treat specific symptoms of atherosclerosis (e.g., leg pain during exercise). • Thrombolytic (fibrinolytic) therapy uses a clot-dissolving drug to break apart a clot that is blocking blood flow. Sometimes called clot busters. **Surgery and other procedures** may include: • Angioplasty and stent placement (percutaneous coronary intervention) • Endarterectomy to remove plaque from artery walls through an incision in the affected artery • Atherectomy • Coronary artery bypass graft (CABG) surgery
Implications in oral healthcare	• As with all conditions affecting the cardiovascular system, oral healthcare providers should understand the causes and treatment of CVD to treat clients effectively and safely. This also includes recognizing signs and symptoms of medication side effects or progression of disorders that require referral and follow up by a medical provider.			
Angina (angina pectoris) [10] [11] [12] [13] [14]	Chest pain caused by temporary disruption of blood flow and oxygen to the myocardium (heart muscle). Considered a warning sign for increased risk for MI or cardiac arrest. May occur with physical	Symptoms may include: • Pain or discomfort that radiates to chest, jaw, shoulders, arms (mostly left), back. • Squeezing, suffocating, or burning feeling, usually in	Tests may include: • Physical exam • Blood tests to check level of cardiac troponins (protein released when heart muscle has been	Often controlled by medication and lifestyle changes. In some cases, surgery may be necessary. **Medication** to help prevent or relieve angina symptoms, such as: • Nitroglycerin

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
	activity, stress, exposure to extreme hot or cold, or after a large meal.	the centre of the chest, behind the sternum. • Dizziness, paleness, weakness. • Symptoms usually last 3-5 minutes, up to 30 minutes, and are relieved by rest or medication (e.g., nitroglycerin).	damaged) to differentiate between angina and MI. May test for cholesterol, triglyceride, and glucose levels. • Electrocardiogram • Echocardiogram • Chest x-ray • Stress test (exercise electrocardiogram) • Nuclear stress test • Transesophageal echocardiogram (TEE). • Cardiac catheterization and angiogram • Thallium scan. • Cardiac computerized tomography (CT) scan • MRI	• Antiplatelets • Beta blockers • Calcium channel blockers Medications to control hypertension, diabetes, blood cholesterol, and other heart conditions. **Surgery** to widen or bypass blocked arteries. Procedures may include: • Percutaneous coronary intervention (angioplasty with stent) • Coronary artery bypass surgery **Lifestyle changes** to reduce risk of developing other CVDs, such as: • Smoking cessation • Increasing physical activity • Maintaining healthy weight • Eating a healthy balanced diet • Drinking less alcohol • Managing stress
Stable angina	Most common type. Usually last 5 minutes by rest, nitroglycerin, or both; rarely more than 15 minutes. Usually managed with medication and lifestyle changes.			
Unstable angina	Can happen at rest, occurs suddenly, lasts longer than 20 minutes, not relieved by rest or nitroglycerin. Should be treated as a medical emergency. May be a sign of impending heart attack.			
Variant angina (Prinzmetal angina, vasospastic angina)	Rare type caused by spasm in coronary arteries that cuts off blood flow. Spasms can result from exposure to cold weather, stress, smoking, cocaine use, or drugs that tighten or narrow arteries. Usually happens while resting, and during the night or early morning. Usually can be treated with medication.			
Microvascular angina (cardiac syndrome X [CSX])	Disease affecting small coronary arteries. Spasms in walls of these arteries reduce blood flow to the heart.			
Implications in oral healthcare	• All chest pain should be assessed by a medical provider. Those diagnosed with angina should seek immediate attention if experiencing unusual symptoms or medication to relieve angina fails to work. Anyone experiencing chest pain for the first time should seek immediate medical attention.			

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
	• Refer to CDHO factsheet on angina for management of clients with angina.[3]			
Myocardial infarction (MI) (heart attack) [10] [15] [16] [17] [18] [19] [20] [21]	Reduction in blood flow through a coronary artery which can result in an infract (tissue death) if blood flow is not immediately restored. Most common cause is atherosclerosis. May also be caused by: • Variant angina (spasm of coronary artery). • Certain infections (e.g., COVID-19, other viral infections that may damage heart muscle). • Spontaneous coronary artery dissection (SCAD), a life-threatening condition caused by a tear inside a coronary artery. Depending on how long blood supply was cut off, damage can be mild, severe, or fatal. MI can lead to cardiac arrest (cardiopulmonary arrest) where the heart stops beating.	Symptoms can be similar to angina and may include: • Pain or discomfort in centre of chest (most common symptoms for both females and males). • Pain or discomfort in arms, shoulders, elbows, jaw, back. • Difficulty breathing or shortness of breath; nausea or vomiting; light-headedness or faintness; cold sweat; and turning pale. • Females are more likely to have shortness of breath, nausea, vomiting, and back or jaw pain. • Symptoms may be sudden or severe; however, many people have warning signs and symptoms hours, days, or weeks in advance. • Some do not experience chest pain, some only have mild discomfort, and some	Tests may include: • Physical exam • ECG measures electrical activity of the heart. Will show if a person is having a MI or had one recently • Blood test to detect troponin • Chest x-ray • Echocardiogram • Cardiac catheterization and angiogram • Cardiac CT scan • Cardiac MRI	Urgent treatment is needed to improve blood flow and restore oxygen levels. Oxygen is given immediately. Treatment depends on if there is partial or complete blockage of blood flow. Treatment may include medication, surgery, and lifestyle changes. **Medications** to treat MI may include: • Aspirin and other antiplatelet medication. • Thrombolytics (clot busters). Earlier the drug is given after MI, less the heart is damaged and greater the chance of survival. • Anticoagulants (e.g., heparin may be given by IV or injection to reduce risk of blood clots). • Nitroglycerin. • Morphine to relieve chest pain not relieved with nitroglycerin. • Beta blockers to slow heartbeat and decrease blood pressure. Beta blockers can limit the amount of heart muscle damage and prevent future MIs. They are given to most people who are having MI. • ACE inhibitors to lower blood pressure and reduce stress on the heart.

[3] Angina, CDHO factsheet https://www.cdho.org/Advisories/CDHO_Factsheet_Angina.pdf

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
		may experience one symptom or a combination.		• Statins. **Surgery** to improve blood flow to the heart may include: • Percutaneous coronary intervention • Coronary artery bypass graft surgery (CABG) **Lifestyle changes** include: • Smoking cessation • Increasing physical activity • Maintaining a healthy weight • Eating a healthy balanced diet • Drinking less alcohol • Managing stress Cardiac rehabilitation to help recovery from MI or other heart conditions.
Implications in oral healthcare	• Oral healthcare providers must be cognizant of signs and symptoms of myocardial infarction. • Oral healthcare providers must be prepared for medical emergencies, which includes current training and practice to provide supportive care, such as CPR and utilization automated AEDs and emergency drugs, as required. • If a client exhibits signs or symptoms of myocardial infarction, 911 should be called immediately and supportive care provided while waiting for arrival of emergency medical services (EMS). • Function and recovery status needs to be assessed to determine if oral healthcare can be provided after a MI. Refer to CDHO factsheets on myocardial infarction and post-myocardial infarction for additional information.[4]			
Heart failure (congestive heart failure) [22] [23] [24] [25] [26] [27] [28] [29] [30]	In heart failure, the heart is unable to efficiently pump blood. It increasingly receives more blood than it can pump out causing congestion (back up). The heart	Symptoms depend on type and seriousness of heart failure. Shortness of breath after routine activities may be one of the first symptoms. Shortness	Tests may include: • Physical exam • Blood tests, including brain natriuretic peptide (BNP) test or	There is no cure. Treatment aims to reduce symptoms, slow further damage, and prolong life. Treatment depends on type and degree of heart failure and

[4] Myocardial infarction, CDHO factsheet https://www.cdho.org/Advisories/CDHO_Factsheet_Myocardial_Infarction.pdf
Post-Myocardial Infarction, CDHO factsheet https://www.cdho.org/Advisories/CDHO_Factsheet_Post-MI.pdf

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
	tries to compensate by beating faster, which can lead to arrhythmia, and expanding in size (to make room for the blood). Not enough blood is pumped to organs, which affects their functioning and causes a range of symptoms. Lungs fill with fluid as a result of blood buildup in the pulmonary veins, which leak fluid into the lungs causing shortness of breath (most common symptom of heart failure). One or both sides of the heart can be affected. Left-sided and right-sided heart failure may have different causes. Damage to the heart leading to heart failure may result from: • Coronary artery disease and MI • Severe, untreated hypertension (hypertensive heart disease) • Heart valve disease • Infections causing myocarditis • Excessive alcohol use and recreational drug use	of breath may also occur while at rest or sleeping. Symptoms of left-sided heart failure may include: • Shortness of breath, which can lead to lightheadedness, dizziness, chest pain • Cough or wheeze • Fatigue (extreme tiredness even after rest) • General weakness • Bluish colour of fingers and lips • Sleepiness and trouble concentrating • Inability to sleep lying flat Symptoms of right-sided heart failure may include: • Nausea and loss of appetite due to lack of blood flow to digestive system and liver. • Pain in abdomen • Swelling (edema) in ankles, feet, legs, abdomen (ascites), and general weight gain • Frequent urination Heart failure can cause complications, such as:	N-terminal pro b-type natriuretic peptide (NT-proBNP) test. Natriuretic peptides are substances made by the heart, which rise during heart failure • Blood tests to assess liver and kidney function • Electrocardiogram • Chest x-ray • Echocardiogram to measure ejection fraction (percent of blood in left ventricle that is pumped out with each heartbeat) • Stress test • Coronary angiography • Cardiac MRI	includes lifestyle changes, medications, and surgery. **Lifestyle changes**, such as reducing salt, aiming for a healthy weight, increasing physical activity, smoking cessation, avoiding or limiting alcohol, managing stress, and getting good quality sleep. Medications may include: • Vasodilators. • Diuretics or aldosterone antagonists (e.g., spironolactone) to reduce fluid and sodium retention. • ACE inhibitors or angiotensin. receptor blockers (ARBs) to relax blood vessels making it easier for the heart to pump blood. • Beta blockers or ivabradine to slow heart rate. • Digoxin to help heart beat stronger. • Anticoagulants or antiplatelets (e.g., aspirin) to help prevent blood clots. **Surgery** may include: • Opening or bypassing blocked arteries. • Biventricular pacemaker (cardiac resynchronization therapy) to help both sides of the heart contract at the same time to relieve symptoms.

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
	• Inherited heart conditions (e.g., familial cardiomyopathies, arrhythmias) • Congenital heart disease • Unknown (idiopathic)	• Blood clots • Kidney or liver damage or failure by reduced blood flow and fluid buildup in these organs. • Pulmonary edema (fluid buildup in lungs) • Pleural effusion (excess fluid around lungs) • Malnutrition from nausea and ascites making it uncomfortable to eat. Reduced blood flow to stomach inhibits nutrient absorption • Other heart conditions (e.g., arrhythmia, leaking heart valves, sudden cardiac arrest)		• Mechanical heart pump (e.g., ventricular assist device or a total artificial heart). • Implantable cardioverter defibrillator (ICD) to correct irregular heart rhythms that can cause sudden cardiac arrest. • Heart transplant if heart failure is life-threatening or other treatments were unsuccessful.
Implications in oral healthcare	• Heart failure often goes undiagnosed so oral healthcare providers should be aware of signs and symptoms to provide medical referral. • Consultation with a medical provider may be indicated depending on the client's condition. Refer to CDHO's factsheet on heart failure for guidance and management of clients with heart failure.[5]			
Cerebrovascular disease [31] [32] [33] [34] [35] [36] [37] [38] [39]	Refers to a group of disorders affecting blood vessels supplying the brain. Alteration in blood flow can sometimes impair brain function temporarily or permanently. When an event occurs suddenly, it is referred to as a cerebrovascular accident (CVA).	Stroke symptoms may include: • Trouble speaking and understanding speech. • Paralysis or numbness of face, arm, or leg, usually just one side of the body. Inability to raise both arms over the head. One side of the mouth may droop.	Tests may include: • Physical exam • Cerebral angiography (vertebral angiogram, carotid angiogram) • Carotid ultrasound • CT scan • Doppler ultrasound	Emergency treatment for stroke depends on whether it is an ischemic or hemorrhagic stroke. **Ischemic stroke**: Treatment for acute stroke focuses on restoring blood flow to the brain by: • Administration of tissue plasminogen activator (tPA) that breaks up the clot

[5] Heart failure, CDHO factsheet https://www.cdho.org/Advisories/CDHO_Factsheet_Heart_Failure_CHF.pdf

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
	Restrictions in blood flow may occur from vessel narrowing (stenosis), clot formation (thrombosis), blockage (embolism) or blood vessel rupture (hemorrhage). Lack of sufficient blood flow (ischemia) affects brain tissue and may cause a stroke. Cerebrovascular disease includes stroke, transient ischemic attack, carotid stenosis, aneurysm, vascular dementia, and vascular malformations.	• Problems seeing in one or both eyes (e.g., blurred, see double). • Sudden, severe headache, which may be accompanied by vomiting, dizziness or altered consciousness. • Trouble walking (e.g., loss of balance or coordination).	• Electroencephalogram (EEG) uses small electrodes placed on the scalp to pick up electrical impulses. These electrical signals are printed out as brain waves • Lumbar puncture (spinal tap) uses a needle to remove a sample of cerebrospinal fluid from the space surrounding the spinal cord. The test can help detect bleeding caused by a cerebral hemorrhage • Magnetic resonance imaging (MRI) • Magnetic resonance angiogram (MRA)	within 4.5 hours after stroke symptom onset if delivered via IV. The window of time is slightly longer if tPA is delivered through a catheter directly to the artery with the clot. • Endovascular thrombectomy (EVT) removes a thrombus (blood clot) with a device attached to a catheter threaded through blood vessels to the brain under image guidance. EVT is recommended for eligible patients within six hours of stroke onset, or up to 24 hours in select patients. To help prevent another stroke or TIA, a procedure to open an artery narrowed by plaque may be recommended. Options depend on the situation and include: • Carotid endarterectomy is surgery to remove plaque blocking a carotid artery. • Angioplasty and stents. (percutaneous coronary intervention) • Anticoagulant or antiplatelet medications. **Hemorrhagic stroke** cannot be treated with tPA. Medications are used to lower pressure in the brain, lower blood pressure, prevent spasms of blood vessels, and prevent seizures. Surgery
Stroke	Most common cerebrovascular disease. Strokes can be ischemic resulting from thrombosis or embolism; or hemorrhagic resulting from vascular rupture. Ischemic stroke is most common type.			
Transient ischemic attack (TIA) (ministroke)	Temporary cerebrovascular event leaving no permanent damage. Caused by temporary decrease in blood supply to part of the brain, lasting as little as five minutes. Symptoms may be similar to stroke, but resolve quickly. Often an early warning sign of impending ischemic stroke.			

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
Carotid stenosis (carotid artery disease)	Narrowing or blockage of the carotid arteries.			may be performed to relieve pressure on the brain and repair the blood vessel. <u>Stroke rehabilitation</u> Most stroke survivors go to a rehabilitation program once they are stabilized.
Aneurysm	Bulge in a blood vessel caused by a weakening of an artery wall. The bulge can rupture and cause life threatening internal bleeding.			
Vascular dementia	Caused by narrowing or blockage in arteries that supply blood to the brain. This reduced blood flow causes damage to the brain.			
Vascular malformations	Abnormalities present in blood vessels.			
Implications in oral healthcare	• Considering the high incidence of stroke, oral healthcare providers will likely encounter clients who have experienced stroke or at high risk for stroke. • It is important to be aware the signs, symptoms, and effects of stroke and other cerebrovascular disorders to provide safe and effective oral healthcare. • Oral healthcare providers have a role in identification of the clients prone to stroke and in stroke prevention. Refer to CDHO factsheet on stroke for more information.[6] • If stroke is suspected, think "FAST" and do the following: ○ **Face.** Ask the person to smile. Does one side of the face droop? ○ **Arms.** Ask the person to raise both arms. Does one arm drift downward? Or is one arm unable to rise? ○ **Speech.** Ask the person to repeat a simple phrase. Is their speech slurred or strange? ○ **Time.** If any of these signs are observed, call 911 immediately.			
Hypertensive heart disease [40] [41] [42] [43]	Hypertensive heart disease refers to heart problems caused by chronic hypertension. Hypertension increases heart workload inducing structural and functional changes in	Most often symptoms of hypertensive heart disease do not occur until after many years of poor blood pressure control, when damage to the heart has	Tests may include: • Physical exam, including blood and urine tests. • Electrocardiogram	Treatment is based on the diagnosed condition and includes lifestyle changes, medications, and/or surgeries and procedures.

[6] Stroke, CDHO factsheet https://www.cdho.org/Advisories/CDHO_Factsheet_Stroke.pdf

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
	the myocardium, coronary vasculature, and conduction system of the heart. These changes can lead to left ventricular hypertrophy, coronary artery disease, cardiac arrhythmias (especially atrial fibrillation). Complications that manifest clinically as angina, MI, arrhythmia, stroke, heart failure, or sudden cardiac arrest.	occurred. Symptoms vary depending on disease severity and progression. There may be no symptoms, or symptoms may include: • Angina • Shortness of breath • Fatigue • Persistent cough • Loss of appetite • Edema of the ankles or legs • Arrhythmia • Dizziness / fainting • Stroke • Sudden cardiac death	• Echocardiogram • Coronary angiography • Stress test • Nuclear stress test	
Left ventricle hypertrophy (LVH) [44] [45]	Left ventricle is the main pumping chamber of the heart. If the heart has to work too hard to pump blood, the muscles in the walls of the left ventricle hypertrophy (thicken). LVH reduces the heart's efficiency and can result in a lack of oxygen to the myocardium. Eventually, the heart may fail to pump blood forcefully. LVH can also cause changes to the heart's conduction system causing arrhythmia. Hypertension is the most common cause of left ventricular hypertrophy. Females with hypertension are more likely to develop LVH than males with similar blood pressure measurements.	LVH usually develops gradually. Mild LVH may be asymptomatic. As the condition worsens, symptoms may include angina, dizziness, syncope, fast or irregular heartbeat, fatigue, shortness of breath (especially while lying down), edema of legs.	Tests may include: • Physical exam, including blood pressure readings • Echocardiogram • Electrocardiogram • Cardiac MRI.	Treatment helps to stop or slow disease progression. Treatment depends on cause and may include medications (e.g., hypertensive medications), surgery (e.g., aortic valve repair or replacement if caused by aortic valve stenosis), and lifestyle changes to lower blood pressure and increase heart health.

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
Hypertension[7] [40] [41] [42] [46] [47] [48] [49] [50] [51] [52] [53] [54] [55] [56] [57] [58] [59] [60] [61] [62] [63]	Hypertension is a leading modifiable risk factor for CVD and affects almost one in four Canadian adults. Lifetime incidence of developing hypertension is approximately 90%. Two main types of hypertension are primary and secondary.	Most people with hypertension have no symptoms, so they are unaware they have it. However, a few with severe hypertension may have headaches, shortness of breath, dizziness, vision problem, or nosebleeds.	Hypertension diagnosis is usually based on the average of several readings taken on separate occasions. Several readings are needed because blood pressure changes depending on activities and varies during the day. Automated office blood pressure is the preferred method of in-office measurement. The automated device takes a series of measurements without the medical provider or others present. The person is left unattended in a private area while 3-6 consecutive readings are taken at one-to-two-minute intervals (average blood pressure is also computed). Tests used to determine cause of hypertension may include:	Hypertension is the most common modifiable risk factor for CVD. Treatment involves lifestyle changes and use of antihypertensive medications. **Lifestyle changes** include smoking cessation, decreasing alcohol use, increasing physical activity (at least 150 minutes per week of moderate to vigorous aerobic physical activity, in bouts of 10 minutes or more), low sodium diet, maintaining healthy body weight, managing stress, getting good-quality sleep (7-9 hours/day). Ideally, blood pressure should be below 120/80 mmHg to maintain good health and reduce the risk of CVD. **Medications** may include: • Diuretics (often first medication used to treat hypertension) • ACE inhibitors • ARBs • Calcium channel blockers • Beta blockers • Vasodilators • Aldosterone antagonists
Primary (essential) hypertension	Accounts for 90% of adult cases of hypertension. For most adults, there is no identifiable cause and it tends to develop gradually over many years. Atherosclerosis increases risk of hypertension.			
Secondary hypertension	Accounts for remaining 10%. It is caused by an underlying medical condition; tends to appear suddenly; and cause higher blood pressure than primary hypertension. Causes may include: adrenal gland tumours; congenital heart defects; certain drugs, such as cough/cold medicines, non-steroidal anti-inflammatory drugs (NSAIDs) [e.g., aspirin, ibuprofen], birth control pills, herbal supplements (ginseng, licorice, ephedra [ma-huang]), steroids, cocaine, amphetamines;	Signs may include: • Hypertension that does not respond to blood pressure medications (resistant hypertension) • Systolic blood pressure over 180 mmHg or diastolic blood pressure over 120 mmHg • Hypertension no longer responding to medication that previously controlled the blood pressure		

[7] Blood pressure is a measure of the pressure (force) of blood against artery walls. Systolic (top number) is the measure of the pressure when the ventricles contract and push blood through the arteries. Diastolic (bottom number) is the measure of the pressure when the heart relaxes between contractions. Blood pressure changes throughout the day based on the person's activities. Ideally, blood pressure should be below 120/80 mmHg to maintain good health and reduce the risk of CVD. [49] [57]

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
	kidney disease; obstructive sleep apnea; thyroid problems, Cushing syndrome, pregnancy, and obesity.	• Sudden-onset hypertension before age 30 or after age 55 • No family history of hypertension • No obesity	• Blood tests to check levels of potassium, sodium, creatinine, blood glucose, and total cholesterol and triglycerides, etc. • Urine test (urinalysis). • Ultrasound of the kidneys. Many kidney conditions are linked to secondary hypertension. • ECG	
Hypertensive crisis	Occurs when blood pressure rises quickly and severely with readings of 180/120 or greater. May be accompanied by symptoms (e.g., headache, chest pain, nausea, vomiting, dizziness). There are two types of hypertensive crises (hypertensive urgency and hypertensive emergency), both require immediate attention as early evaluation of organ function is critical to determine treatment.			
Hypertensive urgency	Blood pressure is 180/120 or greater without any other associated symptoms of target organ damage (e.g., chest pain, shortness of breath, back pain, numbness, weakness, change in vision, difficulty speaking). Requires immediate medical attention. Treatment often includes adjusting or adding medications, but rarely requires hospitalization.			

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
Hypertensive emergency	Blood pressure is 180/120 or greater and is accompanied by other associated symptoms of target organ damage (e.g., chest pain, shortness of breath, back pain, numbness, weakness, change in vision, or difficulty speaking). Call 911 immediately. Hypertension increases risk[8] of: • Angina • MI • Atrial fibrillation • Heart failure • Coronary artery disease • Atherosclerosis • Retinal disease • Peripheral arterial disease • Kidney disease or failure • Aortic aneurysm • Sexual dysfunction (e.g., erectile dysfunction in males;			

[8] **Risk categories for developing complications** [49] [111]

Risk level	Systolic / diastolic
Low risk	Less than 120 / 80
Moderate risk*	121-134 / 80-84
High risk	135+ / 85+ 130/80 is considered high for individuals with diabetes,
*Moderate risk is also called medium risk. Some may refer to it as 'high-normal' blood pressure or 'prehypertension.' These blood pressure targets are for adults <80 years. Consult a medical provider for targets for children, youth, or adults over >80 years.	

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
	may contribute to lower libido in females) • Cerebrovascular disease • Vascular dementia Risk factors for hypertension include: • Age. Blood vessels naturally thicken and stiffen over time. Hypertension risk is increasing for children and youth, possibly because more are living with overweight or obesity. • Sex. Males are more likely to develop hypertension during middle age. After 65, females are more likely to develop hypertension. Females who have hypertension during pregnancy are more likely to have hypertension later in life. • Ethnicity. People of Indigenous, South Asian, and African heritage are more likely to develop hypertension. • Family history. Increased risk if parent or sibling has hypertension. • High BMI. Excess weight causes changes in blood vessels, kidneys, etc., which can increase blood pressure.			

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
	• Lack of exercise can increase weight gain. • Smoking, chewing tobacco, or vaping immediately raises blood pressure temporarily. Tobacco smoking injures blood vessel walls increasing risk of atherosclerosis. • Excess sodium can lead to fluid retention increasing blood pressure. • Low potassium levels. Potassium helps balance the amount of salt in the body. • Excess alcohol use has been linked with increased blood pressure, particularly in males. • Certain drugs (e.g., birth control pills, amphetamines, some antidepressants, steroids, some NSAIDs, etc.). • Stress. High levels of stress can lead to a temporary increase in blood pressure. Stress-related habits (e.g., eating more, tobacco or alcohol use) can further increase blood pressure. • Certain chronic conditions, such as kidney disease, diabetes, thyroid problems, sleep apnea, and metabolic syndrome. • Social and economic factors. Research shows factors such			

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
	as income, education, where a person lives, and type of job may contribute to hypertension risk. Working early or late shifts can raise risk. Experiencing danger, harm, or trauma as a child is associated with higher risk of developing hypertension.			
Implications in oral healthcare	• Screening for hypertension, including referral for early diagnosis and treatment, is important in clinical practice to reduce the burden of CVD complications. • It is critical to know when it is appropriate to proceed with oral healthcare services when a client has hypertension to prevent medical emergencies. Refer to the CDHO factsheets on hypertension in adults and hypertension in children and adolescents for blood pressure charts and advice on managing clients with hypertension.[9]			
Peripheral arterial disease (PAD) (peripheral vascular disease) [4] [64] [65] [66] [67]	Narrowing of the peripheral arteries caused by atherosclerosis. Most common type is lower-extremity PAD, in which blood flow is reduced to the legs and feet. Upper-extremity PAD (arms, hands, and fingers) is less common but affects about 10% of the population. PAD may also affect the arteries supplying the kidneys or stomach, increasing risk of organ damage.	Many have mild or no symptoms. Some experience leg pain when walking (claudication). Pain in the leg is usually the first sign of PAD. Claudication symptoms include muscle pain or cramping in the legs or arms that begins during exercise and ends with rest. Pain is most often felt in the calf. Pain can range from mild to severe. Other symptoms may include: • Coldness in the lower leg or foot, especially when compared to the other side	Tests may include: • Physical exam. • Assessing pulse in the affected area to determine blood flow. • Blood tests to check for conditions related to PAD (e.g., high cholesterol and triglycerides, diabetes). • Ankle-brachial index (ABI) compares blood pressure in the ankle with blood pressure in the arm. Blood pressure readings	Treatment is to manage symptoms (e.g., leg pain) and improve artery health to reduce risk of further complications (e.g., critical limb ischemia from severe blockages, may lead to amputation of affected limb). Treatment may include lifestyle changes, medications, and surgeries or other procedures. **Lifestyle** changes include smoking cessation, regular exercise (e.g., walking), healthy diet, etc. **Medications** may include drugs to control cholesterol, blood pressure, diabetes. Antiplatelets to prevent clotting. Thrombolytic therapy to dissolve blood

[9] Hypertension In Adults, CDHO factsheet https://www.cdho.org/Advisories/CDHO_Factsheet_Hypertension.pdf
Hypertension In Children & Adolescents, CDHO factsheet https://www.cdho.org/Advisories/CDHO_Factsheet_Hypertension_in_Children.pdf

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
		• Leg numbness, weakness • No pulse or weak pulse in legs or feet • Painful cramping in one or both hips, thighs, or calf muscles after certain activities (e.g., walking, climbing stairs) • Shiny skin or skin colour changes on legs • Slower toenail growth • Sores on toes, feet, or legs that will not heal • Pain when using the arms (e.g., aching, cramping when knitting, writing, or doing manual tasks) • Erectile dysfunction • Hair loss or slower hair growth on legs • If PAD gets worse, pain may occur during rest or when lying down, and may interrupt sleep	may be taken before and immediately after exercising (e.g., walking on treadmill). Common test used to diagnose PAD. • Ultrasound. • Doppler ultrasound. • Angiography to assess for blockages using MRI or CT scans.	clot blocking an artery. A clot-dissolving drug may be given directly into the affected artery. **Surgery** may include angioplasty with stent to open blocked arteries or artery bypass to redirect blood around partially or fully blocked arteries.
Implications in oral healthcare	• It is important to know the signs and symptoms of peripheral arterial disease to make appropriate referrals for medical care.			
Arrhythmia (heart rhythm disorder) [68] [69] [70]	Irregular or abnormal heartbeat caused by faulty electrical signals that cause the heart to beat: • Too slow (bradycardia, resting heart rate less than 60 beats per minute),	Heart arrhythmias may be asymptomatic. If they do occur, signs and symptoms may include: • Fluttering in the chest • Tachycardia	Tests may include: • Physical exam • ECG • Holter and event monitor • Echocardiogram	Arrhythmias may be treated with lifestyle changes, medications, surgery, or other procedures. Treatment depends upon the type and frequency of arrhythmia. **Lifestyle changes** may include:

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
Tachycardia [68] [70]	• Too fast (tachycardia, resting heart rate more than 100 beats per minute), or • Cause uncoordinated contractions (fibrillation). Arrhythmias are generally grouped by speed of the heart rate (i.e., tachycardia and bradycardia). Two main types of tachycardia are tachycardia above a ventricle and tachycardia in a ventricle <u>Tachycardia above a ventricle</u>	• Bradycardia • Chest pain • Shortness of breath • Anxiety • Fatigue • Lightheadedness or dizziness • Sweating • Syncope or near fainting	• Stress test (exercise electrocardiogram) • Electrophysiology study (EPS) • Tilt-table exam	• Reducing stress • Limiting alcohol and caffeine (coffee, tea, soft drinks, chocolate, some OTC pain meds) • Healthy diet and increasing physical activity **Medications** may include: • Drugs to stabilize the heart rhythm, such as antiarrhythmics, digitalis/digoxin, beta blockers, calcium channel blockers • Anticoagulants to prevent blood clots **Surgery** may be needed if medications and lifestyle changes do not work. This may include: • Ablation • Cardioversion therapy • Implantable cardioverter defibrillator (ICD) • Implantable pacemaker
Atrial fibrillation (A-fib)	Common form of tachycardia where electrical activity in the atria is disorganized and very rapid preventing atria from pumping effectively. May be temporary, but some A-fib episodes may not stop unless treated. Associated with complications such as stroke.			
Atrial flutter	An extra or early electrical impulse travels around the atria in a circular path rather than down along its normal path, which causes the atria to flutter, contracting at a much higher rate than normal. Usually not life threatening, but can cause chest pain, faintness, or stroke.			

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
Supraventricular tachycardia	Broad term that includes arrhythmias that start above the ventricles. Causes episodes of palpitations that begin and end abruptly.			
Paroxysmal supraventricular tachycardia (PSVT)	Occurs when a short circuit rhythm develops in right atrium. This results in a regular but rapid heartbeat that starts and stops abruptly, produces heart rates between 140 and 250 beats per minute. Usually occurs in people born with an extra electrical circuit between the atria and ventricles. Often starts in youth, but may also start later in life. May be distressing, but rarely life-threatening.			
	<u>Tachycardia in a ventricle</u>			
Ventricular fibrillation	Rapid, chaotic electrical signals cause the ventricles to quiver instead of contacting to pump blood. Can be fatal if a normal heart rhythm is not restored within minutes using a defibrillator to reset normal rhythm. Most people who have ventricular fibrillation have an underlying heart disease or have experienced serious trauma.			

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
Ventricular tachycardia	Ventricles beat too fast which do not allow the ventricles to properly fill with blood. If tachycardia becomes severe, the heart cannot pump effectively. May not cause serious problems in people with an otherwise healthy heart. In those with heart disease, ventricular tachycardia can be a medical emergency requiring immediate medical treatment.			
Postural orthostatic tachycardia syndrome (POTS)	Rapid heartbeat that can increase up to 120 beats per minute within 10 minutes of standing. POTS makes it difficult to adjust to a standing position from a lying down position. Commonly appears between 12-50 years and typically affects more females. Although POTS can be severely debilitating, many will slowly improve over time and the majority will respond to treatment.			
Bradycardia [68] [70] [71]	Bradycardia can be caused by sick sinus syndrome and heart block.			
Sick sinus syndrome	Malfunction in the heart's natural pacemaker (the sinus node), which makes it fire too slowly. May be caused by aging or disease. Some medications can also cause or aggravate a slow heartbeat. The			

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
	resulting arrhythmia may be temporary or permanent. Heart block Slowing down or interruption of the electrical signal from the atria to the ventricles. May develop in adults or children. Babies can be born with a heart block if they have a congenital heart defect or the mother has an autoimmune disorder (e.g., lupus). Sometimes, no cause can be identified.			
Implications in oral healthcare	• It is essential to know if clients have arrhythmias, and if so, how frequent they have arrhythmic events and how they manage them. This will help to monitor clients during appointments so if an arrhythmic event occurs, the event can be managed and appropriate referrals made.			
Rheumatic heart disease [72] [73]	Rheumatic heart disease is a condition in which the heart has been permanently damaged by rheumatic fever. Rheumatic fever is an inflammatory disease that can be triggered by a streptococcal bacterial infection. It usually starts as a strep throat infection or scarlet fever that has been untreated or under-treated with antibiotics. Rheumatic heart disease usually occurs 10-20 years after the initial illness. Every part of the heart may be damaged by inflammation caused by rheumatic fever, including the pericardium, the endocardium, and the valves. The most common form of rheumatic	Symptoms of rheumatic fever include: • Fever • Painful joints, most often the knees, ankles, elbows, and wrists • Migrating pain from joint to joint • Red, warm, swollen joints • Small, painless bumps beneath the skin • Chest pain • Heart murmur • Painless rash with a jagged edge (erythema marginatum) • Jerky movements (Sydenham chorea), most	There is no specific test for rheumatic heart disease. The first step is to determine if the person had a strep infection. A throat culture and/or a blood test might be able to find strep antibodies if the infection was recent. If too much time has passed, the antibodies will be gone but the person may recall having a recent infection. Tests to check for heart damage include: • Echocardiogram • Chest x-ray	Children or young adults with heart damage from rheumatic fever may need to take daily antibiotics until they are 25 to 30 years old. This helps to prevent another bout of rheumatic fever and avoid the development of infective endocarditis. Additional treatment will depend on the type of damage to the heart.

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
	heart disease affects the heart valves, mainly the mitral valve. The damage can cause valve stenosis, valve regurgitation, and/or damage to the heart muscle. In time, valve disorders may lead to atrial fibrillation or heart failure. Not everyone with rheumatic fever will develop rheumatic heart disease.	often in hands, feet, and face • Outbursts of unusual behaviours accompanying Sydenham chorea, such as crying or inappropriate laughing Symptoms of heart valve problems may include: • Chest discomfort or pain • Irregular or rapid heartbeats (heart palpitations) • Shortness of breath • Fatigue or weakness • Light-headedness, dizziness, or near fainting • Swelling of the abdomen (ascites), feet, or ankles		
Implications in oral healthcare	• It is important to be aware if clients are in the high-risk group to receive prophylactic antibiotics to prevent infective endocarditis. See additional information on infective endocarditis below and refer to the 2007 American Heart Association (AHA) Guideline on the Prevention of Infective Endocarditis.			
Valvular heart disease [74]	Heart valve disease occurs when one or more of the heart valves do not open or close properly. Can be classified as mild, moderate, or severe. Can lead to an enlarged heart or heart failure. Called multiple valvular heart disease if two or more valves affected.	Many do not notice symptoms until blood flow is significantly reduced. Symptoms may include: • Chest discomfort, pressure, tightness. • Palpitations. • Shortness of breath. • Fatigue, weakness.	Tests may include: • Physical exam • Echocardiogram • Angiogram • Chest x-ray • Electrocardiogram • Stress test • Cardiac MRI	Treatment depends on disease severity. Minor conditions may not require treatment. **Medication** cannot cure valvular heart disease, but may relieve swelling, arrythmia, hypertension, and other symptoms. Medications may include: • Diuretics

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
	Types include stenosis, prolapse, and regurgitation. **Valvular stenosis** Stenosis is when the valve opening becomes narrow and restricts blood flow. In severe cases, the valve opening can become so narrow the body may not receive adequate blood flow. Any heart valve can be affected. If the tricuspid valve narrows, blood is not able to fully move from the right atrium to the right ventricle, which can cause the atrium to enlarge, affecting pressure and blood flow in the surrounding chambers and veins. It can also cause the right ventricle to become smaller, so less blood circulates to the lungs to pick up oxygen. If the pulmonary valve narrows, the flow of oxygen-poor blood from the right ventricle through the pulmonary arteries to the lungs is restricted. This affects blood's ability to pick up oxygen and deliver oxygenated blood to the rest of the body. With pulmonary valve stenosis, the right ventricle must work harder to pump blood through	• Light-headedness, dizziness, or near fainting is most common with aortic stenosis. • Swelling can occur when valve problems cause blood to back up in other parts of the body, leading to fluid buildup and swollen abdomen (ascites), feet, and ankles.		• Anticoagulants • Antiarrhythmics **Surgeries and other procedures** to repair or replace heart valves. Valve repair • Heart valves may be repaired by patching holes or tears, reshaping the valve, or separating valve leaflets so they can open and close properly. • Valve stenosis may be opened by inserting a thin catheter with a balloon at the tip through a blood vessel to the narrowed valve. The balloon is then inflated to widen the valve opening. This procedure is called balloon valvulopasty. • Annuloplasty is a technique to repair an enlarged annulus (a ring of fibrous issue at the base of the heart valve). Sutures are sewn around the ring to make the opening smaller. Or a ring-like device is attached around the outside of the valve opening so that it can close more tightly. **Valve replacement** If a faulty heart valve cannot be repaired, it is removed and replaced with a mechanical valve or a biological valve.
Tricuspid valve stenosis				
Pulmonary valve stenosis				

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
	the narrowed pulmonary valve and the pressure in the heart is often increased.			• Mechanical valves are made from durable metals, carbon, ceramics, and plastics. • Biological valves are made from animal tissue, donated human tissue, or a patient's own tissues. Biological valves are not as durable as mechanical valves. An alternative to open-heart surgery to replace a malfunctioning aortic valve is a less invasive procedure called transcatheter aortic valve implantation (TAVI or TAVR). A replacement valve is inserted through a catheter that is guided to the heart with the ultrasound and chest x-rays. **Lifestyle changes** to lower risk of developing other CVDs by knowing and controlling blood pressure, diabetes, and blood cholesterol. Healthy lifestyle choices include being smoking free, more active, maintaining a healthy weight, eating a balanced diet, drinking less alcohol, and managing stress.
Mitral valve stenosis	When the mitral valve narrows, blood flow from the left atrium to the left ventricle is reduced. This can cause fatigue and shortness of breath because the volume of blood carrying oxygen from the lungs is reduced. Pressure from the blood that has stayed in the left atrium can cause the atrium to enlarge and fluid to build up in the lungs.			
Aortic valve stenosis	When the aortic valve narrows, blood flow from the heart to the aorta and to the rest of the body is restricted. As a result, the left ventricle must contract harder to try push blood across the aortic valve, which can lead to thickening of the left ventricle (left vernacular hypertrophy) and can eventually makes the heart less efficient.			
	Valvular prolapse Prolapse is a condition when the valve leaflets slip out of place or form a bulge. This can lead to improper or uneven closure of the heart valve. As a result of the prolapsed valve, blood may leak			

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
	backwards through the valve and one-way blood flow may be disrupted.			
Mitral valve prolapse	Mitral valve fails to close evenly. Part or all the mitral valve bulges upward into the atrium when the ventricles contracts. This can allow a small amount of blood to leak backward through the valve (regurgitation). Mitral valve prolapse is also called click-murmur syndrome, Barlow's syndrome, or floppy valve syndrome.			
Tricuspid, pulmonary, and aortic valve prolapse	These prolapses are less common than mitral valve prolapse. Similar to mitral valve prolapse, the leaflets do not close completely and fail to form a tight seal. **Regurgitation** Regurgitation can happen when the valve does not close properly and allows blood to flow backwards. This disruption of the one-way blood flow in the heart puts a strain on the heart, reduces its pumping efficiency and limits its ability to supply the body with oxygenated blood.			

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
Tricuspid valve regurgitation	When the tricuspid valve does not close properly, blood that is being pumped forward from the right ventricle to the lungs can leak backward into the right atrium, and the atrium may become enlarged.			
Pulmonary valve regurgitation	When the pulmonary valve does not close completely, blood can leak back from the lungs into the heart. This backward blood flow mixes oxygen-poor and oxygenated blood, and reduces the availability of oxygenated blood to the rest of the body.			
Mitral valve regurgitation	Blood leaks backward into the left atrium through the mitral valve from the ventricle as it contracts. This reduces the amount of blood that flows to the rest of the body. As a result of regurgitation, the blood volume and pressure are increased in the left atrium. In severe cases, the increase in volume and pressure may lead to enlargement of the atrium and build-up of fluid (congestion) in the lungs.			
Aortic valve regurgitation	This results when oxygenated blood leaks backward from the aorta into the left ventricle with each heartbeat. The heart must work			

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
	harder to supply enough oxygenated blood to the body. Over time the walls of the ventricle may hypertrophy, increasing the risk of heart failure.			
Implications in oral healthcare	• As per the 2007 American Heart Association Guidelines, antibiotic prophylaxis is required for individuals with prosthetic cardiac valve or prosthetic cardiac valve repair for certain dental procedures. See additional information on infective endocarditis below and refer to the 2007 AHA Guideline on the Prevention of Infective Endocarditis.			
Inflammatory heart disease [75] [76] [77] [78] [79] [80] [81] [82] [83] [84] [85] [86] [87]	Inflammation can affect lining of the heart or valves, heart muscle, or tissue surrounding the heart. It can lead to serious problems, including arrhythmia, heart failure, and coronary heart disease. Heart inflammation can happen suddenly or progress slowly. Three main types of heart inflammation are endocarditis, pericarditis, and myocarditis.	Symptoms depend on type and severity of heart inflammation. Symptoms may feel like flu or may be more serious. If there is chest pain or severe shortness of breath, or if symptoms get worse, call 911 or seek medical help right away.	Sometimes hard to diagnose heart inflammation because symptoms can vary depending on the type and the person. Diagnostic tests may include: • Physical exam. • Heart imaging tests (e.g., cardiac MRI, echocardiogram, chest x-ray) • Endomyocardial biopsy (EMB) to assess for myocarditis. • Heart valve tissue testing to identify microbes involved in endocarditis. • Pericardiocentesis to remove excess fluid in the pericardium (pericardial effusion is the buildup of too	Treatment depends on the type and cause of heart inflammation. Myocarditis and pericarditis often resolve on their own after a few weeks. Treatment may include medications, procedures, or surgery. **Medication** for endocarditis include: • Antibiotics to treat bacterial infections. Long-term courses of intravenous antibiotics are taken. Each course can last as long as six weeks. • Antifungals to treat fungal infections. Sometimes lifelong oral antifungal treatment may be recommended to prevent the infection from returning. **Medication** for myocarditis include: • Corticosteroids to treat myocarditis caused by autoimmune disorders. • Intravenous immunoglobulin (IVIG) helps control the immune and inflammatory response.
Endocarditis	Inflammation of the endocardium (inner lining of the heart chambers and valves). Rare but life-threatening disease. Usually occurs when bacteria (or fungi) from elsewhere in the body enter the bloodstream and attach to and attack lining of heart valves and/or chambers. Inflammation caused by infection is called infective endocarditis.	Endocarditis symptoms • Flu-like symptoms • New or worsening heart murmur • Fatigue • Blood in urine • Enlarged spleen • Stomach pain • Chest pain • Cough with or without blood • Appetite, weight loss		

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
	Pieces of vegetations (clumps of microbes) can break off and travel to different parts of the body, blocking blood flow or spreading infection. Risk factors include older age (over 60 years), prosthetic heart valves, damaged heart valves (e.g., from rheumatic fever), congenital heart defects, history of endocarditis, implanted heart device (e.g., pacemaker), IV recreational drug use (contaminated needles/syringes increase risk); long term catheter use; poor oral health.	• Muscle, joint, back pain • Swelling in feet, legs, or abdomen (ascites) • Night sweats • Pain in area of cardiac device (e.g., pacemaker) may mean infection • Shortness of breath • Skin changes including: petechiae (e.g., on skin, conjunctiva of eyes, oral mucosa), Janeway lesions (irregular, nontender hemorrhagic macules on palms or soles), Osler's nodes (red-purple, tender, slightly raised cutaneous nodules, often with a pale centre on tips or sides of fingers or toes)	much fluid in the double-layer of the pericardium). The fluid is then tested for bacteria, signs of cancer, or other causes of pericarditis. • Blood tests may help identify cause of heart inflammation. • Blood cultures to identify and treat the exact bacterium, virus, or fungus causing the infection in endocarditis or pericarditis. • Cardiac troponins or creatine kinase-MB are blood markers that increase when there is heart damage. Since there are no specific blood tests for myocarditis, these markers are useful to show injury to the heart muscle. However, they also increase with heart attack or heart failure and do not necessarily mean there is	**Medication** for pericarditis include: • Drugs to relieve pain and reduce inflammation (e.g., colchicine, aspirin, and NSAIDs such as ibuprofen). • Corticosteroids are used only in people who are not responding to or cannot take NSAIDs. • Intravenous immunoglobulin (IVIG) **Procedures and surgery** to treat heart inflammation may include: • Heart surgery to manage damage to valves or nearby heart tissue from endocarditis. It may involve removal of infected tissues or reconstruction of the heart, including repairing or replacing the affected valve. • Pericardiocentesis removes extra fluid in the pericardium (called pericardial effusion). • Implantable cardioverter defibrillator or pacemaker to control irregular heartbeats that do not resolve after a short period of time. • Pericardiectomy is surgery to remove the pericardium. This treatment is only recommended when medication or other treatments have not worked. It can be a successful option for individuals who have pericarditis that goes away and comes back or who have end-stage constrictive
Myocarditis	Inflammation of the myocardium. Inflammation can cause acute or chronic changes to the heart muscle. Can affect small or large sections of the heart muscle, making it hard for the heart to pump blood, which may lead to heart failure. Clots can form in the heart, leading to a stroke or heart attack.	Myocarditis symptoms • Chest pain, discomfort • Arrhythmias • Lightheadedness, fainting • Shortness of breath, at rest or during activity • Extreme tiredness, weakness • Stomach pain • Exercise intolerance • Loss of appetite		

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
Pericarditis	Inflammation of the pericardium (sac surrounding the heart). Pericardium is made of two thin layers of tissue with a small amount of fluid in between, which keeps the layers from rubbing against each other and causing friction. An inflamed pericardium causes irritation, swelling, and pain. Most cases of pericarditis are mild and resolve without treatment in a few days or weeks. Common causes of heart inflammation include infections, autoimmune disorders, and certain medications. **Infections** <u>Viral</u>. Most common cause of myocarditis and pericarditis. Viruses include SARS-CoV-2, adenovirus, coxsackievirus (e.g., hand, foot, and mouth disease), herpes virus, influenza virus, parvovirus B19 (which causes fifth disease, a common infection in children). <u>Bacteria</u>. Most common cause of endocarditis. In most developed	• Swelling of feet, legs • Flu-like symptoms Pericarditis symptoms • Chest pain that feels sharp, gets worse with breathing, and feels better with sitting up and leaning forward • Fast heartbeat • Fever • Shortness of breath If a virus caused the heart inflammation, the person may have had a cough, runny nose, or gastrointestinal symptoms a few weeks before noticing symptoms of heart inflammation.	myocarditis. They are often normal in cases of subacute or chronic myocarditis. • C-reactive protein (CRP) or erythrocyte sedimentation rate (ESR) may indicate inflammation in the body if higher than normal. • Complete blood count looks for higher levels of white blood cells, which might indicate infection. • Serum cardiac autoantibodies (AAbs) are substances the body can make if a person has an autoimmune disorder. These antibodies can attack the heart muscle.	pericarditis, where the pericardium becomes thickened and scarred. • Heart transplant for those with very severe myocarditis.

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
	countries, *Staphylococcus aureus* is the most common bacteria type that causes endocarditis. Bacteria can enter the blood in many ways, including during a medical or dental procedure or through intravenous drug use. *Streptococcus* (strep) bacteria can cause endocarditis, but is more common in less developed countries. Fungi. Rare cause of myocarditis and pericarditis. Most caused by *Candida* (yeast) or *Aspergillus* (mold). More common in individuals with compromised immune systems (e.g., from HIV, cancer, diabetes). Parasites. Can cause myocarditis (e.g., parasite that causes Chagas disease can specifically affect the heart during the infection. Chagas disease is a serious health problem in Latin America. The parasite is spread by certain insects. **Autoimmune disorders** (e.g., rheumatoid arthritis, lupus) may cause pericarditis or myocarditis and can damage heart valves, which can lead to endocarditis.			

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
	Medications can cause side effects that may lead to myocarditis, pericarditis, or both. These include: • Antibiotics (e.g., penicillin) • Antidepressants (e.g., tricyclic antidepressants) • Benzodiazepines (e.g., lorazepam, diazepam) • Diuretics (e.g., furosemide, hydrochlorothiazide) • Heart medicines (e.g., amiodarone, hydralazine, methyldopa, procainamide) • Psychiatric medicines (e.g., clozapine, lithium) • Seizure medicines (e.g., phenytoin) • Vaccines, which may cause allergic reactions leading to myocarditis, although this is rare[10] • Weight-loss medicines (e.g., phentermine-fenfluramine [phen-fen]) Risk factors include: • Age. Although all ages can be affected, different age groups are at risk for different types of			

[10] A population-based cohort study of 1.65 million doses of Pfizer COVID-19 vaccinations among adolescents in Ontario, Canada by Buchan et al. (2023) showed risk of myocarditis or pericarditis remained very rare after vaccination and should be considered in relation to the benefits of COVID-19 vaccination and reduced risk of COVID-19 infection. [112]

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
	heart inflammation. Myocarditis and pericarditis occur more often in young adults. Pericarditis commonly affects middle-aged adults. Older adults more at risk for endocarditis caused by bacteria. • Sex. Heart inflammation from endocarditis, myocarditis, and pericarditis is more common in males. Except inflammation caused by autoimmune disorders (e.g., lupus, rheumatoid arthritis) is more common in females. Endocarditis and pericarditis occur twice as often in males. • Family history. Genetics play a role in the risk of developing all three types of heart inflammation. • Environment. Chagas disease, common in Latin America, can cause acute and chronic myocarditis. Endocarditis caused by *Streptococcus* bacteria is more common in less developed countries. • Lifestyle choices. Risk may be higher with excessive alcohol use; cocaine, amphetamines, or			

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
	intravenous recreational drug use; or poor oral health. <u>Medical conditions</u> such as: • Diabetes due to increase risk of infection • Eating disorders (e.g., anorexia) • HIV/AIDS may lead to myocarditis due to treatment, viral, bacterial, fungal infections, or nutritional deficiencies • Skin disorders (e.g., burns or infections that occur often) • Procedures to treat other medical conditions carry a risk of infection, which can lead to heart inflammation (e.g., implanting a pacemaker or defibrillator)			
Implications in oral healthcare	Important to remind clients with risk factors for endocarditis to take steps to prevent bacterial growth on the endocardium, such as: • Avoiding recreational intravenous drugs use. • Washing hands and skin regularly and wash cuts or scrapes right away to help prevent infection. • Maintaining good oral health and attending oral healthcare appointments regularly. [76] Important to note individuals with endocarditis have a lifelong risk of acquiring the disease again. Those with pericarditis can have the disease again in the first 18 months after treatment. Those with myocarditis are at risk of having the disease years after their first time. Thus, it is important for at risk individuals to prevent other health problems and lower the risk of having heart inflammation again, by: • Continuing all medications as prescribed by the attending medical practitioner (treatment for endocarditis and pericarditis often lasts for weeks), • Avoiding known causes and risk factors, • Making healthy lifestyle changes, and • Receiving regular oral healthcare. [88]			

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
Congenital heart disease (congenital heart defects) [89] [90] [91] [92] [93] [94] [95]	Heart condition that affects the normal development and functioning of the heart caused by malformations of the heart structure from birth. Can range from minor conditions which never cause problems, to serious conditions requiring treatment. Two main types are septal defects (hole in heart) and obstruction of blood flow. <u>Septal defects</u> When a baby is born with an abnormal opening in the septum, blood can leak between chambers instead of flowing normally to the body. This may cause the heart to become enlarged. Most common holes in the heart are atrial septal defect, patent foramen ovale, and ventricular septal defect.	Symptoms may include: • Heart murmur • Arrhythmia • Cyanosis (bluish tint to the skin, lips, fingernails [blue baby]) • Cool, clammy skin • Fast breathing • Shortness of breath • Fainting • Poor feeding, especially in infants because of tiring easily while nursing • Poor weight gain in infants • Fatigue during exercise or activity in older children • Irritability and/or prolonged crying • Abnormal rounding of the nail-bed (clubbing) • Stroke	Tests may include: • Physical exam • Chest x-ray • Pulse oximetry to measure oxygen in blood • Cardiac catheterization • Echocardiogram or fetal echocardiogram • Electrocardiogram • Cardiac MRI • Genetic testing	Treatment depends on the type of congenital heart disease and may include medications, surgery and other procedures, and lifestyle changes. **Medications** may be used to treat symptoms and reduce stress on the heart by controlling blood pressure, heart rate, arrhythmia, or amount of fluid in the body. Medications may include: • ACE inhibitors • Beta blockers • Diuretics • Digoxin • Prostaglandin E1 (PGE1) – keeps the ductus arteriosus open in children with patent ductus arteriosus. The open ductus arteriosus improves blood flow and oxygen levels until the defect is surgically corrected. • Antiarrhythmics **Surgery and other procedures** may be required to: • Repair holes between chambers • Repair or replace valves • Repair or reconnect major blood vessels Catheter-based procedures (non-surgical) may include:
Atrial septal defect (ASD)	An abnormal opening between right and left atria causes the heart to work extra hard to pump blood. The seriousness of the problem depends on size of the opening.			
Patent foramen ovale (PFO)	Type of atrial septal defect. The hole between left and right atria usually closes within the first few years of life. Even if it does not close, the hole may not cause any			

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
	complications unless there is a second heart defect. PFOs are very common and many are unaware they have one.			• Cardiac catheterization to repair simple holes in the heart or open narrowed areas without surgery. • Percutaneous valve repair or replacement to correct defective cardiac valves that are too narrow or leaky. • Transcatheter aortic valve implantation (TAVI) where an artificial aortic valve is placed in the damaged valve rather than replace it. Open heart surgery may be necessary if problems cannot be corrected with less invasive procedures. Surgery may be used to: • Repair holes in the heart • Repair a patent ductus arteriosus • Repair complex defects • Repair or replace a valve • Widen blood vessels • Heart transplant **Lifestyle changes** to lower risk of developing other CVD.
Ventricular septal defect (VSD)	Hole between the right and left ventricles. Depending on size of the opening, surgery may be needed to close the hole.			
	<u>Obstruction of blood flow</u> Stenosis is a narrowing or obstruction in heart valves, arteries, or veins that affects blood flow. Atresia is when a passageway in the body is abnormally closed or has not formed properly. Different types of stenosis and atresia can partly or completely block blood flow in the heart.			
Pulmonary valve stenosis	Pulmonary valve is narrowed, which can range from mild to severe. The greater the narrowing, the harder the right ventricle must work to pump blood to the lungs. The increased pressure causes the right ventricle to become thick.			
Pulmonary atresia	Pulmonary valve does not form properly and remains closed at birth. Blood is not able to flow properly to the lungs to receive			

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
	oxygen. Instead, some blood travels to the lungs through other natural passages within the heart and its arteries. These passages are necessary when a fetus develops, and typically close soon after birth. Fatal if left untreated.			
Tricuspid atresia	Tricuspid valve does not form properly resulting in no opening between right atrium and right ventricle, which limits blood flow through the heart. Causes right ventricle to under develop. The condition is fatal if left untreated.			
Aortic stenosis (aortic valve stenosis)	When the aortic valve narrows, blood flow is restricted from the heart through the aorta to the body. As a result, left ventricle must contract harder to push blood across aortic valve, which eventually weakens the heart muscle making it less efficient.			
Coarctation of the aorta	Narrowing of the aorta which forces the heart to pump harder to move blood through the aorta. Can range from mild to severe and usually occurs with other heart defects. May not be detected until adulthood. The condition can be treated, but life-long follow-up is needed.			

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
Patent ductus arteriosus	Ductus arteriosus is a passageway for blood between the aorta and pulmonary artery that normally closes a few days after birth. If it fails to close properly, too much blood flows to the lungs. The condition is common in premature babies, but rare in full-term babies. Severity depends on size of opening and prematurity of the baby.			
Tetralogy of Fallot	Combination of four defects that lowers blood oxygen levels. Defects include: • Ventricular septal defect. • Pulmonary valve stenosis. • Right ventricular hypertrophy (muscular wall of right ventricle becomes thick because heart is overworked). Over time heart may stiffen, become weak, and eventually fail. • Overriding aorta (aorta is positioned directly over a ventricular septal defect, instead of over left ventricle). Aorta receives some blood from right ventricle, which reduces amount of oxygen in the blood.	Infants and children with tetralogy of Fallot usually have blue-tinged skin due to low oxygen levels (cyanosis).		
Transposition of the great arteries	Pulmonary artery and aorta are reversed. Aorta is connected to right ventricle, so most deoxygenated			

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
	blood from the body is pumped back out before getting oxygenated. The pulmonary artery is connected to the left ventricle, so most oxygenated blood from the lungs returns to the lungs again. The condition is often detected during first week of life. Other defects between right and left sides of the heart often co-exist with this condition. An atrial septal defect, ventricular septal defect, or ductus arteriosus can actually help oxygenated blood circulate to the body.			
Ebstein's anomaly	Rare condition where tricuspid valve has abnormal leaflets and is located lower than normal. This causes blood to leak backwards through the valve, the right ventricle to be too small, and right atrium to be too large, which prevents the heart from working efficiently.	Many children have asymptomatic mild cases that may not cause symptoms until later in adulthood.		
Hypoplastic left heart syndrome	Left side of the heart is underdeveloped resulting in small left ventricle; small or unformed mitral and aortic valves; and small ascending aorta. Children with this condition often have an atrial septal defect.			

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
Implications in oral healthcare	• Antibiotics may be recommended before certain dental procedures to prevent endocarditis in individuals at high-risk. See additional information on infective endocarditis below and refer to the 2007 AHA Guideline on the Prevention of Infective Endocarditis.			
Cardiomyopathy [96] [97] [98] [99] [100] [101] [102] [103] [104]	Cardiomyopathy literally means heart muscle disease. The disease reduces the heart's ability to pump blood. As cardiomyopathy worsens, the heart becomes weaker, less able to pump blood, and incapable of maintaining a normal electrical rhythm. May result in heart failure, arrhythmias, and other complications (e.g., heart valve problems). Cause is often unknown. In some cases, it is acquired (develops due to another condition) or inherited. Cardiomyopathy can affect all ages. Health conditions or behaviours that can lead to acquired cardiomyopathy include: • Chronic hypertension • Genetic conditions • Heart tissue damage from previous MI or infection (e.g., COVID-19) • Chronic rapid heart rate • Valvular heart disease • High BMI • Pregnancy complications • Lack of essential vitamins or minerals (e.g., thiamin)	May be no signs or symptoms in early stages. But as condition advances, signs and symptoms may include: • Breathlessness with activity or at rest • Edema of legs, ankles, feet • Ascites • Cough while lying down • Difficulty lying flat to sleep • Fatigue • Arrhythmias • Chest discomfort or pressure • Dizziness, lightheadedness, fainting	Tests may include: • Physical exam • Blood tests to check kidney, thyroid, and liver function and measure iron levels • Blood test to measure B-type natriuretic peptide (BNP), a protein produced in the heart. BNP may rise during heart failure, a common complication of cardiomyopathy • Chest x-ray • Echocardiogram • Electrocardiogram • Stress test • Cardiac catheterization, which may include heart tissue biopsy • Cardiac MRI • Cardiac CT scan • Genetic testing	Treatment depends on the type and severity of cardiomyopathy and treatment of the underlying cause (if known). Treatment may include lifestyle changes, medications, surgery, and other procedures. **Lifestyle** changes may include light to moderate physical activity, healthy eating while managing fluid and salt intake, avoiding alcohol, maintaining healthy weight, etc. **Medications** may include hypertensive drugs, antiarrhythmic drugs, anticoagulants, and digoxin. **Surgery and other procedures** may include: • Alcohol septal ablation, a minimally invasive procedure to treat hypertrophic cardiomyopathy**.** A small portion of the thickened heart muscle is destroyed by injecting alcohol through a catheter into the artery supplying the area. The damaged tissue dies and is replaced by thinner scar tissue, improving blood flow through the heart. • Radiofrequency ablation to treat arrythmia.

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
Dilated (congestive) cardiomyopathy	• Metabolic disorders (e.g., obesity, thyroid disease, diabetes) • Hemochromatosis (causing iron buildup in heart muscle) • Sarcoidosis (growth of tiny lumps of inflammatory cells [granulomas] in any part of the body, including heart and lungs) • Amyloidosis (buildup of abnormal proteins in organs) • Connective tissue disorders (e.g., rheumatoid arthritis) • Chronic excessive alcohol use • Cocaine, amphetamines, or anabolic steroids use • Certain chemotherapy drugs and radiation therapy Types include dilated, hypertrophic, restrictive, arrhythmogenic right ventricular cardiomyopathy, and broken heart syndrome. Most common type where left ventricle becomes dilated (enlarged) and cannot effectively pump blood. The problem can spread to right ventricle and atria. Can affect all ages but mostly affects middle-aged males.			• Implantable cardioverter defibrillator. • Implantable pacemaker. • Ventricular assist device. • Septal myectomy is open-heart surgery where part of the thickened heart septum separating the ventricles is removed to improve blood flow through the heart and reduce mitral valve regurgitation. Used to treat hypertrophic cardiomyopathy. • Heart transplant for end-stage heart failure when medications and other treatments no longer work.

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
Hypertrophic cardiomyopathy (HCM)	Involves abnormal thickening of the heart muscle, and mostly affects the left ventricle. In obstructive hypertrophic cardiomyopathy the ventricle size remains normal, but thickening of the walls may block blood flow out of the ventricles. HCM can lead to arrhythmias. In rare cases, may cause cardiac arrest during vigorous physical activity. HCM is usually an inherited disease caused by gene mutations, but sometimes cause is not clear. Can develop at any age, but usually more severe if occurs during childhood.			
Restrictive cardiomyopathy	Heart muscle becomes stiff and less elastic decreasing its ability to expand, which limits amount of blood that can fill the heart chambers. Rare condition that can occur at any age, but mostly affects older people. Can occur for no known reason (idiopathic), or can be caused by other diseases (e.g., hemochromatosis, amyloidosis, sarcoidosis, connective tissue disorders, eosinophilic heart disease).			
Arrhythmogenic right ventricular	Rare type of cardiomyopathy where right ventricular muscle is replaced	Most common symptoms include palpitations, fainting,		

Types	Description	Signs & symptoms	Diagnostic tests	Treatment
cardiomyopathy (ARVC)	by fat or scar tissue, which interferes with normal heart rhythm. Also known as arrhythmogenic right ventricular dysplasia (ARVD). Leading cause of sudden cardiac death among young people, especially young athletes. But can be present in people at any age and fitness level. Often caused by genetic mutations.	chest pain and a rapid, irregular heartbeat.		
Broken heart syndrome (stress cardiomyopathy, takotsubo cardiomyopathy)	Often caused by severe emotional or physical stress (e.g., sudden illness [e.g., asthma attack, COVID-19], loss of loved one, major surgery, serious accident), which makes the heart muscle weaken rapidly. The condition disrupts normal heart rhythm; causes left ventricle to temporarily enlarge; and leads to even more forceful contractions in other areas of the heart. These changes cause temporary heart muscle failure. Exact cause is unclear. Females are primarily affected, particularly after menopause.	Main symptoms are chest pain and shortness of breath. It may feel like a MI but arteries are not blocked and there is no permanent damage. It is often a temporary condition.		
Implications in oral healthcare	• It is vital to be cognizant of clients' heart function and their ability to participate in daily activities to determine if they can tolerate oral healthcare appointments safely. If unknown or in doubt, consult with their medical provider.			

Prevention of infective endocarditis[11]

As per the 2007 American Heart Association (AHA) Guideline on the Prevention of Infective Endocarditis,[12] only individuals at greatest risk of an adverse outcome from infective endocarditis require antibiotic prophylaxis prior to certain dental procedures.

AHA guidelines are based on a growing body of scientific evidence that indicates the risks associated with prophylactic antibiotic use, including a range of adverse reactions and development of drug-resistant bacteria, outweigh any benefits. To reduce the risk of infective endocarditis, AHA guidelines emphasize the importance of maintaining excellent oral health through regularly scheduled oral healthcare visits and daily oral hygiene, which decreases the incidence of bacteremia associated with daily activities.

Those at greatest risk of an adverse outcome from infective endocarditis should receive single dose preventive antibiotics before all dental procedures that involve manipulation of gingival tissue or the periapical regions of teeth or that perforate the oral mucosa.

Dental procedures antibiotic prophylaxis recommended[13] [105] [106]

Dental procedures that involve manipulation of gingival tissue or the periapical region of the teeth or perforation of the oral mucosa, examples include:
Periodontal procedures: • Scaling and root planing • Curetting tissue • Periodontal probing • Periodontal surgery • Subgingival placement of antibiotic fibers and strips
Tooth extraction
Suture removal
Biopsies
Prophylactic cleaning of teeth or implants where bleeding is anticipated
Dental implant placement and replantation of avulsed teeth
Endodontic instrumentation or surgery only beyond the apex
Placement of orthodontic bands
Intraligamentary and intraosseous local anaesthetic injections
Excluding: local anesthetic placement (unless through site of infection)

The following procedures and events **do not need prophylaxis** for high-risk individuals:

- Routine anesthetic injection through noninfected soft tissue
- Dental radiographs
- Placement of removable prosthodontic or orthodontic appliances

[11] Refer to Episode 23 for additional information on antibiotic prophylaxis.
[12] Prevention of Infective Endocarditis Guidelines from the American Heart Association (2007) https://www.ahajournals.org/doi/full/10.1161/CIRCULATIONAHA.106.183095
[13] Recommended Antibiotic Prophylaxis Regimens for the Prevention of Infective Endocarditis and Hematogenous Joint Infection, CDHO Guideline, June 14, 2021 https://www.cdho.org/docs/default-source/pdfs/reference/guidelines/antibioticprophylaxis.pdf

- Adjustment of orthodontic appliances
- Placement of orthodontic brackets
- Shedding of deciduous teeth
- Bleeding from trauma to the lips or oral mucosa

The following table, based on the AHA guidelines, outlines individuals at greatest risk of an adverse outcome from infective endocarditis and require antibiotic prophylaxis, as well as those for which routine prophylaxis is not required. [107] [108]

Antibiotic prophylaxis IS REQUIRED for individuals with:	**Routine antibiotic prophylaxis IS NOT required for individuals with:**
1. Prosthetic cardiac valve or prosthetic cardiac valve repair	1. Mitral valve prolapse
2. History of infective endocarditis	2. Rheumatic heart disease
3. Cardiac transplant that develops a problem in a heart valve	3. Bicuspid valve disease
4. Specific serious congenital heart conditions including: • Unrepaired or incompletely repaired cyanotic congenital heart disease, including those with palliative shunts and conduits • Completely repaired congenital heart defect with prosthetic material or device, whether placed by surgery or by catheter intervention, during the first six months after the procedure • Any repaired congenital heart defect with residual defect at the site or adjacent to the site of a prosthetic patch or a prosthetic device	4. Calcified aortic stenosis 5. Congenital heart conditions such as ventricular septal defect, atrial septal defect, and hypertrophic cardiomyopathy.

In 2021, a group consisting of experts in prevention and treatment of infective endocarditis, including members of the American Dental Association, the Infectious Diseases Society of America, and the American Academy of Pediatrics, in addition to the AHA, reviewed the 2007 guidelines to examine evidence of the acceptance and impact of the 2007 recommendations on viridans group streptococcal infective endocarditis and, if needed, make revisions based on this evidence.

The authors concluded that based on the review of the available evidence, there were no recommended changes to the 2007 guidelines. The guidelines continue to recommend viridans group streptococcal infective endocarditis prophylaxis only for categories of individuals at highest risk for adverse outcome while emphasizing the critical role of good oral health and regular access to dental care for all. Randomized controlled studies to determine whether antibiotic prophylaxis is effective against viridans group streptococcal infective endocarditis are needed to further refine recommendations. [109]

The 2021 AHA scientific statement highlights:

- Good oral hygiene and regular oral healthcare are the most important ways to reduce infective endocarditis caused by bacteria in the mouth.
- There are four categories of heart patients considered to be at highest risk for adverse outcomes from infective endocarditis, and only these patients are recommended to receive preventive antibiotic treatment prior to invasive dental procedures.
- AHA guidelines issued in 2007 suggested not to use antibiotics before certain dental procedures. These recommendations resulted in a decrease in antibiotic use. [109] [110]

Take home messages

- Close monitoring of clients with a history of CVD is important to help prevent a medical emergency.
- Awareness of the types of CVD and management strategies is important since the probability of treating clients with CVD is high.
- Interdisciplinary collaboration is vital to provide safe and effective oral healthcare.
- Following the AHA Guidelines for the Prevention of Infective Endocarditis and the judicial use of antibiotics is important for antibiotic stewardship.

References

[1] Heart and Stroke Foundation of Canada, "Types of heart disease," 2023. [Online]. Available: https://www.heartandstroke.ca/heart-disease/what-is-heart-disease/types-of-heart-disease. [Accessed 22 February 2023].

[2] National Cancer Institute, "Cardiovascular disease," [Online]. Available: https://www.cancer.gov/publications/dictionaries/cancer-terms/def/cardiovascular-disease. [Accessed 22 February 2023].

[3] NHS, "Cardiovascular disease," 22 April 2022. [Online]. Available: https://www.nhs.uk/conditions/cardiovascular-disease/. [Accessed 22 February 2023].

[4] Heart and Stroke Foundation of Canada, "Atherosclerosis," 2023. [Online]. Available: https://www.heartandstroke.ca/heart-disease/conditions/atherosclerosis. [Accessed 22 February 2023].

[5] American Heart Association, Inc, "What is Atherosclerosis?," 6 November 2020. [Online]. Available: https://www.heart.org/en/health-topics/cholesterol/about-cholesterol/atherosclerosis. [Accessed 22 February 2023].

[6] Mayo Clinic, "Arteriosclerosis / atherosclerosis," 1 July 2022. [Online]. Available: https://www.mayoclinic.org/diseases-conditions/arteriosclerosis-atherosclerosis/symptoms-causes/syc-20350569. [Accessed 22 February 2023].

[7] D. Christiano, "What Is an Atheroma?," Healthline, 17 September 2018. [Online]. Available: https://www.healthline.com/health/atheroma. [Accessed 22 February 2023].

[8] MedlinePlus, "Blood Clots," 2023. [Online]. Available: https://medlineplus.gov/ency/article/001124.htm. [Accessed 22 February 2023].

[9] National Heart, Lung, and Blood Institute, "Atherosclerosis Treatment," 24 March 2022. [Online]. Available: https://www.nhlbi.nih.gov/health/atherosclerosis/treatment. [Accessed 22 February 2023].

[10] Heart and Stroke Foundation of Canada, "Angina," 2023. [Online]. Available: https://www.heartandstroke.ca/heart-disease/conditions/angina. [Accessed 23 February 2023].

[11] Mayo Clinic, "Angina," 30 March 2022. [Online]. Available: https://www.mayoclinic.org/diseases-conditions/angina/diagnosis-treatment/drc-20369378. [Accessed 23 February 2023].

[12] National Heart, Lung, and Blood Institute, "Angina (Chest pain) Diagnosis," 24 March 2022. [Online]. Available: https://www.nhlbi.nih.gov/health/angina/diagnosis. [Accessed 23 February 2023].

[13] MedlinePlus, "Angina," 3 January 2017. [Online]. Available: https://medlineplus.gov/angina.html. [Accessed 23 February 2023].

[14] American Heart Association, "Microvascular Angina," 6 December 2022. [Online]. Available: https://www.heart.org/en/health-topics/heart-attack/angina-chest-pain/microvascular-angina. [Accessed 23 February 2023].

[15] Heart and Stroke Foundation of Canada, "Heart attack," 2023. [Online]. Available: https://www.heartandstroke.ca/heart-disease/conditions/heart-attack. [Accessed 23 February 2023].

[16] Mayo Clinic, "Heart attack Symptoms & causes," 21 May 2022. [Online]. Available: https://www.mayoclinic.org/diseases-conditions/heart-attack/symptoms-causes/syc-20373106. [Accessed 23 February 2023].

[17] Mayo Clinic, "Heart Attack Diagnosis," 21 May 2022. [Online]. Available: https://www.mayoclinic.org/diseases-conditions/heart-attack/diagnosis-treatment/drc-20373112. [Accessed 23 February 2023].

[18] World Health Organization, "Cardiovascular diseases Symptoms," 2023. [Online]. Available: https://www.who.int/health-topics/cardiovascular-diseases#tab=tab_2. [Accessed 23 February 2023].

[19] Heart and Stroke Foundation of Canada, "What is cardiac arrest?," 2023. [Online]. Available: https://www.heartandstroke.ca/heart-disease/conditions/cardiac-arrest. [Accessed 23 February 2023].

[20] Heart and Stroke Foundation of Canada, "Echocardiogram," 2023. [Online]. Available: https://www.heartandstroke.ca/heart-disease/tests/echocardiogram. [Accessed 23 February 2023].

[21] MedlinePlus, "Troponin Test," 9 September 2021. [Online]. Available: https://medlineplus.gov/lab-tests/troponin-test/. [Accessed February 2023].

[22] National Heart, Lung, and Blood Institute, "What Is Heart Failure?," 24 March 2022. [Online]. Available: https://www.nhlbi.nih.gov/health/heart-failure. [Accessed 24 February 2023].

[23] National Heart, Lung, and Blood Institute, "Heart Failure Symptoms," 24 March 2022. [Online]. Available: https://www.nhlbi.nih.gov/health/heart-failure/symptoms. [Accessed 24 February 2023].

[24] National Heart, Lung, and Blood Institute, "Heart Failure Treatment," 24 March 2022. [Online]. Available: https://www.nhlbi.nih.gov/health/heart-failure/treatment. [Accessed 24 February 2023].

[25] Heart and Stroke Foundaton of Canada, "Heart failure," 2023. [Online]. Available: https://www.heartandstroke.ca/heart-disease/conditions/heart-failure. [Accessed 24 February 2023].

[26] A. Kandola, "Medical News Today," 16 February 2023. [Online]. Available: https://www.medicalnewstoday.com/articles/signs-of-congestive-heart-failure. [Accessed 24 February 2023].

[27] R. Blumenthal and S. Jones, "Congestive Heart Failure: Prevention, Treatment and Research," John Hopkins Medicine, 2023. [Online]. Available: https://www.hopkinsmedicine.org/health/conditions-and-diseases/congestive-heart-failure-prevention-treatment-and-research. [Accessed 24 February 2023].

[28] Heart and Stroke Foundation of Canada, "Heart transplant surgery," 2023. [Online]. Available: https://www.heartandstroke.ca/heart-disease/treatments/surgery-and-other-procedures/heart-transplant-surgery. [Accessed 24 February 2023].

[29] NHS, "Inherited heart conditions," 18 November 2022. [Online]. Available: https://www.nhsinform.scot/illnesses-and-conditions/heart-and-blood-vessels/conditions/inherited-heart-conditions. [Accessed 24 February 2023].

[30] MedlinePlus, "Natriuretic Peptide Tests (BNP, NT-proBNP)," 4 March 2021. [Online]. Available: https://medlineplus.gov/lab-tests/natriuretic-peptide-tests-bnp-nt-probnp/. [Accessed 24 February 2023].

[31] American Association of Neurological Surgeons, "Cerebrovascular Disease," 2023. [Online]. Available: https://www.aans.org/en/Patients/Neurosurgical-Conditions-and-Treatments/Cerebrovascular-Disease. [Accessed 25 February 2023].

[32] Mayo Clinic, "Stroke Overview," 20 January 2022. [Online]. Available: https://www.mayoclinic.org/diseases-conditions/stroke/symptoms-causes/syc-20350113. [Accessed 24 February 2023].

[33] Mayo Clinic, "Stroke Diagnosis," 20 January 2022. [Online]. Available: https://www.mayoclinic.org/diseases-conditions/stroke/diagnosis-treatment/drc-20350119. [Accessed 24 February 2023].

[34] Heart and Stroke Foundation of Canada, "Stroke First few days," 2023. [Online]. Available: https://www.heartandstroke.ca/stroke/recovery-and-support/stroke-care/first-few-days. [Accessed 25 February 2023].

[35] V. Lights, "Carotid Stenosis," Healthline, 31 March 2017. [Online]. Available: https://www.healthline.com/health/carotid-stenosis. [Accessed 25 February 2023].

[36] K. Holland, "What Is Vascular Dementia?," Healthline, 14 February 2022. [Online]. Available: https://www.healthline.com/health/dementia/vascular-dementia. [Accessed 25 February 2023].

[37] D. Wells, "Cerebrovascular Disease," Healthline, 17 April 2019. [Online]. Available: https://www.healthline.com/health/cerebrovascular-disease. [Accessed 25 February 2023].

[38] National Heart, Lung, and Blood Institute, "Heart Tests," 24 March 2022. [Online]. Available: https://www.nhlbi.nih.gov/health/heart-tests. [Accessed 25 February 2023].

[39] Mayo Clinic, "Carotid ultrasound," 12 January 2023. [Online]. Available: https://www.mayoclinic.org/tests-procedures/carotid-ultrasound/about/pac-20393399. [Accessed 25 February 2023].

[40] K. Riaz, "Hypertensive Heart Disease," Medscape, 15 December 2020. [Online]. Available: https://emedicine.medscape.com/article/162449-overview. [Accessed 26 February 2023].

[41] G. Tackling and M. Borhade, "Hypertensive Heart Disease," StatPearls Publishing, 27 June 2022. [Online]. Available: https://www.ncbi.nlm.nih.gov/books/NBK539800/. [Accessed 25 February 2023].

[42] Cleveland Clinic, "Hypertensive Heart Disease," 21 September 2021. [Online]. Available: https://my.clevelandclinic.org/health/diseases/21840-hypertensive-heart-disease. [Accessed 26 February 2023].

[43] C. Badii, "Hypertensive Heart Disease," Healthline, 17 September 2018. [Online]. Available: https://www.healthline.com/health/hypertensive-heart-disease. [Accessed 26 February 2023].

[44] Cleveland Clinic, "Left Ventricular Hypertrophy," 20 September 2021. [Online]. Available: https://my.clevelandclinic.org/health/diseases/21883-left-ventricular-hypertrophy. [Accessed 26 February 2023].

[45] Mayo Clinic, "Left ventricular hypertrophy," 24 September 2022. [Online]. Available: https://www.mayoclinic.org/diseases-conditions/left-ventricular-hypertrophy/symptoms-causes/syc-20374314. [Accessed 26 February 2023].

[46] A. Leung, T. Bushnik, D. Hennessy and etal., "Risk factors for hypertension in Canada," Statistics Canada, 20 February 2019. [Online]. Available: https://www150.statcan.gc.ca/n1/pub/82-003-x/2019002/article/00001-eng.htm. [Accessed 26 February 2023].

[47] Mayo Clinic, "High blood pressure (hypertension)," 15 September 2022. [Online]. Available: https://www.mayoclinic.org/diseases-conditions/high-blood-pressure/symptoms-causes/syc-20373410. [Accessed 26 February 2023].

[48] Mayo Clinic, "High blood pressure (hypertension) Diagnosis," 15 September 2022. [Online]. Available: https://www.mayoclinic.org/diseases-conditions/high-blood-pressure/diagnosis-treatment/drc-20373417. [Accessed 26 February 2023].

[49] Heart and Stroke Foundation of Canada, "High blood pressure," 2023. [Online]. Available: https://www.heartandstroke.ca/heart-disease/risk-and-prevention/condition-risk-factors/high-blood-pressure. [Accessed 26 February 2023].

[50] American Heart Association, Inc., "Health Threats from High Blood Pressure," 4 March 2022. [Online]. Available: https://www.heart.org/en/health-topics/high-blood-pressure/health-threats-from-high-blood-pressure. [Accessed 26 February 2023].

[51] Mayo Clinic, "Secondary hypertension Overview," 9 August 2022. [Online]. Available: https://www.mayoclinic.org/diseases-conditions/secondary-hypertension/symptoms-causes/syc-20350679. [Accessed 26 February 2023].

[52] Mayo Clinic, "Secondary Hypertension Diagnosis," 9 August 2022. [Online]. Available: https://www.mayoclinic.org/diseases-conditions/secondary-hypertension/diagnosis-treatment/drc-20350684. [Accessed 26 February 2023].

[53] Government of Canada, "Signs and symptoms of high blood pressure," 2 May 2017. [Online]. Available: https://www.canada.ca/en/public-health/services/diseases/heart-health/high-blood-pressure/signs-symptoms-high-blood-pressure.html. [Accessed 26 February 2023].

[54] National Heart, Lung, and Blood Institute, "High Blood Pressure Symptoms," 24 March 2022. [Online]. Available: https://www.nhlbi.nih.gov/health/high-blood-pressure/symptoms. [Accessed 26 February 2023].

[55] National Heart, Lung, and Blood Institute, "High Blood Pressure Causes and Risk Factors," 24 March 2022. [Online]. Available: https://www.nhlbi.nih.gov/health/high-blood-pressure/causes. [Accessed 26 February 2023].

[56] MyHealth.Alberta.ca, "High Blood Pressure," 10 January 2022. [Online]. Available: https://myhealth.alberta.ca/Health/Pages/conditions.aspx?hwid=hw62787. [Accessed 26 February 2023].

[57] Hypertension Canada, "Understanding and Managing Your Blood Pressure," [Online]. Available: https://guidelines.hypertension.ca/wp-content/uploads/2022/09/HTC_Brochure_UnderstandingBP_2018_R3.pdf. [Accessed 26 February 2023].

[58] Hypertension Canada, "2020 - 2022 Hypertension Highlights," 2022. [Online]. Available: https://guidelines.hypertension.ca/wp-content/uploads/2022/09/2020-22-HT-Guidelines-E-WEB_v3b.pdf. [Accessed 26 February 2023].

[59] American Heart Association, "Hypertensive Crisis: When You Should Call 911 for High Blood Pressure," 30 November 2017. [Online]. Available: https://www.heart.org/en/health-topics/high-blood-pressure/understanding-blood-pressure-readings/hypertensive-crisis-when-you-should-call-911-for-high-blood-pressure. [Accessed 26 February 2023].

[60] University of Ottawa Heart Institute, "Ambulatory Blood Pressure Monitor," 2023. [Online]. Available: https://www.ottawaheart.ca/test-procedure/ambulatory-blood-pressure-monitor. [Accessed 26 February 2023].

[61] L. Thomas, "Ambulatory Blood Pressure Monitoring," News-Medical.Net, 3 September 2018. [Online]. Available: https://www.news-medical.net/health/Ambulatory-Blood-Pressure-Monitoring.aspx. [Accessed 26 February 2023].

[62] Heart and Stroke Foundation of Canada, "Risk and prevention," 2023. [Online]. Available: https://www.heartandstroke.ca/heart-disease/risk-and-prevention. [Accessed 26 February 2023].

[63] National Heart, Lung, and Blood Institute, "What Is Metabolic Syndrome?," 18 May 2022. [Online]. Available: https://www.nhlbi.nih.gov/health/metabolic-syndrome. [Accessed 26 February 2023].

[64] American Heart Association, Inc., "What is Peripheral Artery Disease (PAD)?," 2 June 2021. [Online]. Available: https://www.heart.org/en/health-topics/peripheral-artery-disease/about-peripheral-artery-disease-pad. [Accessed 26 February 2023].

[65] Mayo Clinic, "Peripheral artery disease (PAD) Overview," 21 June 2022. [Online]. Available: https://www.mayoclinic.org/diseases-conditions/peripheral-artery-disease/symptoms-causes/syc-20350557. [Accessed 27 February 2023].

[66] Mayo Clinic, "Peripheral artery disease (PAD) Diagnosis," 21 June 2022. [Online]. Available: https://www.mayoclinic.org/diseases-conditions/peripheral-artery-disease/diagnosis-treatment/drc-20350563. [Accessed 27 February 2023].

[67] Vascular Cures, "Peripheral Artery Disease," [Online]. Available: https://www.vasculararcures.org/peripheral-artery-disease. [Accessed 27 February 2023].

[68] Mayo Clinic, "Heart arrhythmia Overview," 30 April 2022. [Online]. Available: https://www.mayoclinic.org/diseases-conditions/heart-arrhythmia/symptoms-causes/syc-20350668. [Accessed 27 February 2023].

[69] Mayo Clinic, "Heart arrhythmia Diagnosis," 30 April 2022. [Online]. Available: https://www.mayoclinic.org/diseases-conditions/heart-arrhythmia/diagnosis-treatment/drc-20350674. [Accessed 27 February 2023].

[70] Heart and Stroke Foundation of Canada, "Arrhythmia," 2023. [Online]. Available: https://www.heartandstroke.ca/heart-disease/conditions/arrhythmia. [Accessed 27 February 2023].

[71] Heart and Stroke Foundation of Canada, "Heart block," 2023. [Online]. Available: https://www.heartandstroke.ca/heart-disease/conditions/heart-block. [Accessed 27 February 2023].

[72] Heart and Stroke Foundation of Canada, "Rheumatic heart disease," 2023. [Online]. Available: https://www.heartandstroke.ca/heart-disease/conditions/rheumatic-heart-disease. [Accessed 27 February 2023].

[73] Mayo Clinic, "Rheumatic fever Overview," 19 April 2022. [Online]. Available: https://www.mayoclinic.org/diseases-conditions/rheumatic-fever/symptoms-causes/syc-20354588. [Accessed 27 February 2023].

[74] Heart and Stroke Foundation of Canada, "Valvular heart disease," 2023. [Online]. Available: https://www.heartandstroke.ca/heart-disease/conditions/valvular-heart-disease. [Accessed 27 February 2023].

[75] National Heart, Lung, and Blood Instittute, "What Is Heart Inflammation?," 24 March 2022. [Online]. Available: https://www.nhlbi.nih.gov/health/heart-inflammation. [Accessed 3 March 2023].

[76] National Heart, Lung, and Blood Institute, "What causes heart inflammation?," 24 March 2022. [Online]. Available: https://www.nhlbi.nih.gov/health/heart-inflammation/causes. [Accessed 27 February 2023].

[77] National Heart, Lung, and Blood Institute, "Heart Inflammaton Types," 24 March 2022. [Online]. Available: https://www.nhlbi.nih.gov/health/heart-inflammation/types. [Accessed 3 March 2023].

[78] National Heart, Lung, and Blood Institute, "Heart Inflammation Causes and Risk Factors," 24 March 2022. [Online]. Available: https://www.nhlbi.nih.gov/health/heart-inflammation/causes. [Accessed 4 March 2023].

[79] National Heart, Lung, and Blood Institute, "Heart Inflammation Symptoms," 24 March 2022. [Online]. Available: https://www.nhlbi.nih.gov/health/heart-inflammation/symptoms. [Accessed 4 March 2023].

[80] National Heart, Lung, and Blood Institute, "Heart Inflammation Diagnosis," 24 March 2022. [Online]. Available: https://www.nhlbi.nih.gov/health/heart-inflammation/diagnosis. [Accessed 4 March 2023].

[81] National Heart, Lung, and Blood Institute, "Heart Inflammation Treatment," 24 March 2022. [Online]. Available: https://www.nhlbi.nih.gov/health/heart-inflammation/treatment. [Accessed 4 March 2023].

[82] Mayo Clinic, "Endocarditis Overview," 25 June 2022. [Online]. Available: https://www.mayoclinic.org/diseases-conditions/endocarditis/symptoms-causes/syc-20352576. [Accessed 4 March 2023].

[83] Heart and Stroke Foundation of Canada, "Infective endocarditis," 2023. [Online]. Available: https://www.heartandstroke.ca/heart-disease/conditions/infective-endocarditis. [Accessed 4 March 2023].

[84] Mayo Clinic, "Myocarditis Overview," 20 May 2022. [Online]. Available: https://www.mayoclinic.org/diseases-conditions/myocarditis/symptoms-causes/syc-20352539. [Accessed 4 March 2023].

[85] Mayo Clinic, "Myocarditis Diagnosis," 20 May 2022. [Online]. Available: https://www.mayoclinic.org/diseases-conditions/myocarditis/diagnosis-treatment/drc-20352544. [Accessed 4 March 2023].

[86] Heart and Stroke Foundation of Canada, "Pericarditis," 2023. [Online]. Available: https://www.heartandstroke.ca/heart-disease/conditions/pericarditis. [Accessed 4 March 2023].

[87] Mayo Clinic, "Pericarditis Overview," 30 April 2022. [Online]. Available: https://www.mayoclinic.org/diseases-conditions/pericarditis/symptoms-causes/syc-20352510. [Accessed 4 March 2023].

[88] National Heart, Lung, and Blood Institute, "Heart Inflammation Recovery," 24 March 2022. [Online]. Available: https://www.nhlbi.nih.gov/health/heart-inflammation/living-with. [Accessed 27 February 2023].

[89] Heart and Stroke Foundation of Canada, "Congenital heart disease," 2023. [Online]. Available: https://www.heartandstroke.ca/heart-disease/conditions/congenital-heart-disease. [Accessed 3 March 2023].

[90] Mayo Clinic, "Pulmonary valve stenosis," 20 December 2022. [Online]. Available: https://www.mayoclinic.org/diseases-conditions/pulmonary-valve-stenosis/symptoms-causes/syc-20377034. [Accessed 3 March 2023].

[91] Mayo Clinic, "Pulmonary atresia," 12 March 2022. [Online]. Available: https://www.mayoclinic.org/diseases-conditions/pulmonary-atresia/symptoms-causes/syc-20350727. [Accessed 3 March 2023].

[92] Mayo Clinic, "Tricuspid atresia," 29 September 2022. [Online]. Available: https://www.mayoclinic.org/diseases-conditions/tricuspid-atresia/symptoms-causes/syc-20368392. [Accessed 3 March 2023].

[93] Mayo Clinic, "Coarctation of the aorta," 25 June 2022. [Online]. Available: https://www.mayoclinic.org/diseases-conditions/coarctation-of-the-aorta/symptoms-causes/syc-20352529. [Accessed 3 March 2023].

[94] National Library of Medicine, "Overriding aorta," [Online]. Available: https://www.ncbi.nlm.nih.gov/medgen/120559. [Accessed 3 March 2023].

[95] Mayo Clinic, "Ebstein anomaly," 5 May 2022. [Online]. Available: https://www.mayoclinic.org/diseases-conditions/ebsteins-anomaly/symptoms-causes/syc-20352127. [Accessed 3 March 2023].

[96] Heart and Stroke Foundation of Canada, "Cardiomyopathy," 2023. [Online]. Available: https://www.heartandstroke.ca/heart-disease/conditions/cardiomyopathy. [Accessed 4 March 2023].

[97] Mayo Clinic, "Cardiomyopathy Overview," 2 April 2022. [Online]. Available: https://www.mayoclinic.org/diseases-conditions/cardiomyopathy/symptoms-causes/syc-20370709. [Accessed 4 March 2023].

[98] Mayo Clinic, "Cardiomyopathy Diagnosis," 2 April 2022. [Online]. Available: https://www.mayoclinic.org/diseases-conditions/cardiomyopathy/diagnosis-treatment/drc-20370714. [Accessed 4 March 2023].

[99] American Heart Association, Inc. , "What Is Cardiomyopathy in Adults?," 3 May 2022. [Online]. Available: https://www.heart.org/en/health-topics/cardiomyopathy/what-is-cardiomyopathy-in-adults. [Accessed 4 March 2023].

[100] American Heart Association, Inc., "Peripartum Cardiomyopathy," 3 May 2022. [Online]. Available: https://www.heart.org/en/health-topics/cardiomyopathy/what-is-cardiomyopathy-in-adults/peripartum-cardiomyopathy-ppcm. [Accessed 4 March 2023].

[101] American Heart Association, Inc., "Transthyretin Amyloid Cardiomyopathy (ATTR-CM)," 8 December 2021. [Online]. Available: https://www.heart.org/en/health-topics/cardiomyopathy/what-is-cardiomyopathy-in-adults/transthyretin-amyloid-cardiomyopathy-attr-cm. [Accessed 4 March 2023].

[102] Mayo Clinic, "Broken heart syndrome," 27 October 2022. [Online]. Available: https://www.mayoclinic.org/diseases-conditions/broken-heart-syndrome/symptoms-causes/syc-20354617. [Accessed 4 March 2023].

[103] Cleveland Clinic, "Broken Heart Syndrome," 20 November 2022. [Online]. Available: https://my.clevelandclinic.org/health/diseases/17857-broken-heart-syndrome. [Accessed 4 March 2023].

[104] Johns Hopkins Medicine, "Alcohol Septal Ablation," 2023. [Online]. Available: https://www.hopkinsmedicine.org/health/treatment-tests-and-therapies/alcohol-septal-ablation. [Accessed 4 March 2023].

[105] College of Dental Hygienists of Ontario, "Recommended Antibiotic Prophylaxis Regimes for the Prevention of Infective Endocarditis and Hematogenous Joint Infection," 14 June 2021. [Online]. Available: https://www.cdho.org/docs/default-source/pdfs/reference/guidelines/antibioticprophylaxis.pdf. [Accessed 4 March 2023].

[106] H. Sroussi, A. Prabhu and J. Epstein, "Which antibiotic prophylaxis guidelines for infective endocarditis should Canadian dentists follow?," *Journal of the Canadian Dental Association,* vol. 73, no. 5, pp. 401-405, June 2007.

[107] W. Wilson, K. Taubert, M. Gewitz, P. B. L. Lockhart, M. Levison, A. Bolger, C. Cabell, M. Takahashi, R. Baltimore, J. Newburger, B. Strom, L. Tani, M. Gerber, R. Bonow, T. Pallasch, S. Shulman, A. Rowley, J. Burns, P. Ferrieri, T. Gardner and D. Goff, "Prevention of Infective Endocarditis - Guidelines From the American Heart Association," *Circulation,* pp. 1736-1754, 9 October 2007.

[108] Canadian Dental Association, "CDA Position on Prevention of Infective Endocarditis," February 2021. [Online]. Available: https://www.cda-adc.ca/en/about/position_statements/infectiveendocarditis/. [Accessed 4 March 2023].

[109] W. Wilson, M. Gewitz, P. Lockhart, A. Bolger, D. DeSimone, D. Kazi, D. Couper, A. Beaton, C. Kilmartin, J. Miro, C. Sable, M. Jackson, L. Baddour and e. on behalf of the American Heart Association Young Hearts Rheumatic Fever, "Prevention of viridans group streptococcal infective endocarditis: A scientific statement from the American Heart Association," *Circulation,* vol. 143, pp. E963-E978, 15 April 2021.

[110] American Heart Association, "Good dental health may help prevent heart infection from mouth bacteria," 15 April 2021. [Online]. Available: https://newsroom.heart.org/news/good-dental-health-may-help-prevent-heart-infection-from-mouth-bacteria. [Accessed 17 May 2021].

[111] Heart and Stroke Foundation of Canada, "Managing your blood pressure," 2022. [Online]. Available: https://heartstrokeprod.azureedge.net/-/media/pdf-files/canada/health-information-catalogue/en-managing-your-blood-pressure.ashx. [Accessed 26 February 2023].

[112] S. Buchan, S. Alley, C. Seo and etal., "Myocarditis or pericarditis events after BNT162b2 vaccination in individuals aged 12 to 17 years in Ontario, Canada," *JAMA Pediatrics,* pp. E1-E8, 27 February 2023.

Client resources

Managing your blood pressure, Heart and Stroke Foundation of Canada, 2022
https://heartstrokeprod.azureedge.net/-/media/pdf-files/canada/health-information-catalogue/en-managing-your-blood-pressure.ashx

Understanding and managing your blood pressure, Hypertension Canada
https://guidelines.hypertension.ca/wp-content/uploads/2022/09/HTC_Brochure_UnderstandingBP_2018_R3.pdf

Additional Resources

Hypertension In Adults, CDHO Factsheet, May 22, 2022, p 1-7
https://www.cdho.org/Advisories/CDHO_Factsheet_Hypertension.pdf

Hypertension In Children & Adolescents, CDHO Factsheet, May 22, 2022, p 1-7
https://www.cdho.org/Advisories/CDHO_Factsheet_Hypertension_in_Children.pdf

Hypertension, CDHO Advisory, May 5, 2022, p 1-29
https://www.cdho.org/Advisories/CDHO_Advisory_Hypertension.pdf

2020 – 2022 Hypertension Highlights: A practical guide informed by the Hypertension Canada Guidelines for the prevention, diagnosis, risk assessment, and treatment of hypertension, Hypertension Canada, 2020
https://hypertension.ca/wp-content/uploads/2020/10/2020-22-HT-Guidelines-E-WEB_v3b.pdf

Hypertension Canada's 2020 Comprehensive Guidelines for the prevention, diagnosis, risk assessment, and treatment of hypertension in adults and children, Rabi, D; McBrien, K; Sapir-Pichhadze, R; et al., Canadian Journal of Cardiology, Volume 36, Issue 5, May 2020, p 596-624
https://www.onlinecjc.ca/article/S0828-282X(20)30191-4/fulltext

Risk factors for hypertension in Canada, Leung, A; Bushnik, T; Hennessy, D; et al. Statistics Canada, *Health Reports*, Volume 30, Issue 2, February 20, 2019, p 3-13
https://www150.statcan.gc.ca/n1/pub/82-003-x/2019002/article/00001-eng.htm

Hypertensive Heart Disease, Tackling, G; Borhade, M. StatPearls [Internet], June 27, 2022 https://www.ncbi.nlm.nih.gov/books/NBK539800/

Obstructive Sleep Apnea, CDHO Factsheet, June 20, 2019, p 1-5
https://www.cdho.org/Advisories/CDHO_Factsheet_Obstructive_Sleep_Apnea.pdf

Direct Oral Anticoagulants, CDHO Factsheet, January 17, 2022, p 1-4
https://www.cdho.org/Advisories/CDHO_Factsheet_DOAC.pdf

Cardiac implantable electronic devices, CDHO Advisory, May 20, 2021, p 1-5
https://www.cdho.org/Advisories/CDHO_Factsheet_Cardiac_Implantable_Electronic_Devices.pdf

Angina, CDHO Factsheet, June 24, 2022, p 1-5
https://www.cdho.org/Advisories/CDHO_Factsheet_Angina.pdf

Angina, CDHO Advisory, January 24, 2022, p 1-22
https://www.cdho.org/Advisories/CDHO_Advisory_Angina_(Angina_Pectoris).pdf

Atrial Fibrillation, CDHO Factsheet, January 17, 2022, p 1-5
https://www.cdho.org/Advisories/CDHO_Factsheet_Atrial_Fibrillation.pdf

Heart Failure, CDHO Factsheet, June 2, 2021, p 1-5
https://www.cdho.org/Advisories/CDHO_Factsheet_Heart_Failure_CHF.pdf

Prevention of infective endocarditis, Guidelines from the American Heart Association, Wilson, W; Taubert, K; Gewitz, M; et al., *Circulation*, Volume 116, Issue 15, October 9, 2007, p 1736-1754
https://www.ahajournals.org/doi/full/10.1161/CIRCULATIONAHA.106.183095

Prevention of viridans group streptococcal infective endocarditis: A scientific statement from the American Heart Association, Wilson, W; Gewitz, M; Lockhart, P; et al. *Circulation*, Volume 143, Issue 20, May 18, 2021, p e963-e978
https://www.ahajournals.org/doi/10.1161/CIR.0000000000000969

Good dental health may help prevent heart infection from mouth bacteria, American Heart Association Scientific Statement, April 15, 2021
https://newsroom.heart.org/news/good-dental-health-may-help-prevent-heart-infection-from-mouth-bacteria

Infective Endocarditis, CDHO Factsheet, June 14, 2021, p 1-8
https://www.cdho.org/Advisories/CDHO_Factsheet_Infective_Endocarditis.pdf

Infective Endocarditis, CDHO Advisory, June 14, 2021, p 1-17
https://www.cdho.org/Advisories/CDHO_Advisory_Infective_Endocarditis_And_Associated_Conditions.pdf

Recommended Antibiotic Prophylaxis Regimens for the Prevention of Infective Endocarditis and Hematogenous Joint Infection, CDHO Guideline, June 14, 2021, p 1-7
https://www.cdho.org/docs/default-source/pdfs/reference/guidelines/antibioticprophylaxis.pdf

CDA position on prevention of infective endocarditis, CDA Board of Directors, February 2021 https://www.cda-adc.ca/en/about/position_statements/infectiveendocarditis/

Myocardial infarction, CDHO Factsheet, September 6, 2019, p 1-4
https://www.cdho.org/Advisories/CDHO_Factsheet_Myocardial_Infarction.pdf

Myocardial Infarction and Cardiac Arrest, CDHO Advisory, August 6, 2019, p 1-24
https://www.cdho.org/Advisories/CDHO_Advisory_Myocardial_Infarction_and_Cardiac_Arrest.pdf

Post-Myocardial Infarction, CDHO Factsheet, July 17, 2021, p 1-6
https://www.cdho.org/Advisories/CDHO_Factsheet_Post-MI.pdf

Stroke, CDHO Factsheet, May 3, 2022, p 1-6
https://www.cdho.org/Advisories/CDHO_Factsheet_Stroke.pdf

Stroke, CDHO Advisory, May 3, 2022, p 1-19
https://www.cdho.org/Advisories/CDHO_Advisory_Stroke.pdf

Myocarditis or Pericarditis Events After BNT162b2 Vaccination in Individuals Aged 12 to 17 Years in Ontario, Canada
https://jamanetwork.com/journals/jamapediatrics/fullarticle/2801804