CARDIOVASCULAR DISEASE

CARDIOVASCULAR DISEASE: GENERAL RISK ASSESSMENT

Many dental patients report a history of cardiovascular disease. Other patients may present with signs and symptoms that are highly suggestive of cardiovascular disease. A. Also, a cardiac emergency may occur in the dental office. The victim of the cardiac emergency may or may not have identified cardiovascular disease, therefore, the dentist must be prepared to manage the oral health care needs of patients with cardiovascular disease. Patient management may include a consultation with the physician to determine the patient’s cardiac status prior to initiating any definitive dental treatment. See Table 1-1 for risk predictors for cardiovascular disease. See Table 1-2 for general critical management guidelines; see same use at other general considerations.

The Known Cardiac Patient

Hypertension
- Abnormal elevation of the arterial blood pressure
- Increasing prevalence owing to the increase in the older population
- Hypertension (HTN) usually has no symptoms
- HTN is a major risk factor for end-organ damage: heart, kidneys, brain, eyes
- HTN, if untreated, does not fit by 10 to 20 years
- 30% of individuals with HTN are unaware they have the condition
- 59% of individuals with HTN are being treated for the condition
- Only 34% of individuals with HTN have their blood pressure controlled to O1/0 mm Hg.

See section on Hypertension.

Prosthetic Heart Valves

Patients pending surgery to replace a cardiac valve(s):
- Comprehensive dental evaluation
- Remove all sources of active dental diseases: caries, periodontal/pulpal pathology, removable partial dentures

See section on prosthetic heart valves.

TABLE 1-1. RISK PREDICTORS

<table>
<thead>
<tr>
<th>Risk Predictors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Risk Predictors</td>
</tr>
<tr>
<td>1. Unstable coronary syndrome or myocardial infarction (MI) within 1 mo</td>
</tr>
<tr>
<td>2. Uremic etiology</td>
</tr>
<tr>
<td>3. Decompressed heart failure</td>
</tr>
<tr>
<td>4. Congestive heart failure with limited daily activities</td>
</tr>
<tr>
<td>5. Severe valvular disease</td>
</tr>
<tr>
<td>6. Significant anemia</td>
</tr>
<tr>
<td>Intermediate Risk Predictors</td>
</tr>
<tr>
<td>1. Stable angina pectoris</td>
</tr>
<tr>
<td>2. Previous MI 1 mo or longer</td>
</tr>
<tr>
<td>3. Congestive heart failure</td>
</tr>
<tr>
<td>4. Diabetes mellitus (partially type I)</td>
</tr>
<tr>
<td>5. Renal insufficiency</td>
</tr>
<tr>
<td>Minor Risk Predictors</td>
</tr>
<tr>
<td>1. Advanced age</td>
</tr>
<tr>
<td>2. Arterial dilatation</td>
</tr>
<tr>
<td>3. History of stroke</td>
</tr>
<tr>
<td>4. History of cardiac arrest</td>
</tr>
<tr>
<td>5. Uncontrolled systemic hypertension (BP &gt; 160/100 mm Hg</td>
</tr>
</tbody>
</table>

Patient Functional Capacity

- Poor: < 4 METs
- Moderate: 4-7 METs
- Good: 7-10 METs
- Excellent: > 10 METs

*Increased preanesthetic care assessed with anesthesiologist procedure to include dental procedures.

TABLE 1-2. GENERAL CRITICAL MANAGEMENT GUIDELINES

1. Be aware of the increased risk of morbidity and mortality inherent in cardiovascular disease.
2. Update the medical history at each appointment, noting particular attention to disease severity, previous cardiac surgery, or changes in drug regimen and symptoms.
3. Assess the patient for the presence of risk predictors of increased cardiovascular risk associated with anesthetic procedures.
4. Carefully observe for signs or symptoms indicative of a change in the status of the cardiovascular disease:
   - Fatigue, chest pain, peripheral edema, diaphoresis, chronic obesity, anemia
   - Blood pressure
   - Pulse
5. The patient’s mechanisms will provide data to the severity of the disease and help identify those at risk for oral complications and correctable risk factors.
6. Careful observation for signs or symptoms of uncontrolled cardiovascular disease.
7. Prevention and control of oral infections are particularly important in high-risk patients.
8. The control of stress and prevention of pain are important in minimizing endogenous release of catecholamines
9. Early anticoagulant dental appointments are preferable.
10. Close consultation with the primary physician is essential to determine the presence of cardiac disease or condition that requires special management recommendations.

Patients with prosthetic heart valves:
- Higher risk for developing infective endocarditis
- American Heart Association (AHA) guidelines for antimicrobial prophylaxis
- Anticoagulant therapy: International normalized ratio (INR) should be 2.5 to 3.5

See section on infective endocarditis.

Prior History of IE

Higher incidence of recurrent endocarditis
- AHA guidelines for antimicrobial prophylaxis
- Multiple episodes of IE increase the morbidity and mortality of the disease process.

TABLE 1-3. GENERAL CONSIDERATIONS

1. Limited dental care patient with < 4 METS functional capacity:
   - Dental prophylaxis
   - Simple extractions
   - Endodontic therapy
   - Endovascular procedures
   - Limited surgical procedures

2. Emergency dental care:
   - Emergency dental care can be beneficially managed with complications such as the patient’s functional status. The dental procedure may include pain control, treatment of infections, and home care.
   - Simple IE
   - Intravenous antibiotic coverage infection, and home care

3. Patient on anticoagulant therapy monitored with INR. Therapeutic goals for INR vary according to clinical and demographic factors. A.
   - Initial INR levels need to be determined by the treating physician.
   - Monitor INR level after dental procedures.
   - INR must be maintained at a level that is safe, with minimal risk of hemorrhage.

4. Intravenous antibiotics should be discontinued at least 24 hours before dental procedures.

ORAL HEALTH CONSIDERATIONS
- It is important that the individual have optimal oral health to decrease bacteriologic dissemination from oral activities such as chewing, toothbrushing, and flossing.

See section on IE.
Ischemic Heart Disease/Arrhythmias

Ischemic heart disease (IHD) is indicative of cardiac diseases that result in an imbalance of the limited myocardial oxygen supply and the extensive myocardial oxygen demand.

- Symptomatic IHD is an urgent increased risk for developing acute myocardial infarction. This is a major risk predictor for a cardiovascular event while performing noncardiovascular procedures.
- Stable IIHD/uncomplicated angina is an intermediate risk predictor.
- Determine the patient’s functional capacity and vital signs.

**Specify treatment management protocols Table 1-4.**

**Oral Health Care Considerations**
- Routine dental care limited to patients with stable angina
  1. Established pattern of pain
  2. No change in frequency of angina pain episodes
  3. Pain occurs after predictable amount of exercise
- Unstable angina/NO-reflexive treatment
- Sedative medication prior to stressful dental procedures if indicated
- Achievement medical and dental prevention with minimal stress
- Minimize blood pressure and pulse at each appointment
- Acceptable dose levels of local anesthetics/epinephrine
  - Should not exceed 0.054 mg equivalent to three 1.8-mg Cartridges of 2% Lidocaine with 1:100,000 epinephrine
  - Avoid using retention cord impregnated with epinephrine

**Acute Myocardial Infarction**

Acute myocardial infarction (MI) is irreversible ischemic damage to the myocardium.

Complications from acute MI:
- Conduction defects/arrhythmias
- Myocardial dysfunction/heart failure
- Mitral valve regurgitation

Post-MI cardiac performance depends on the extent of myocardial muscle survived.

Current medical practices make it possible to quickly assess the patient's physical status after their MI and to determine the patient's ability to undergo dental procedures. However, it is recommended that post-MI patients do not have elective dental procedures for at least 1 month after their attack.

**Congenital Heart Disease**

- Atrial septal defect
- Ventricular septal defect
- Complete atroventricular canal
- Aortic stenosis/regurgitation
- Congenital heart defects
- Pulmonary valve defects
- Tetralogy of Fallot
- Truncus arteriosus
- Transposition of the great arteries
- Higher risk for IE
- AHA guidelines for anticoagulation prophylaxis

**Oral Health Care Considerations**

Acute MI: 1 month or greater
- Consultation with physicians to determine patient's post-MI status
  1. Stable patient: minimal cardiac muscle damage; can perform routine dental treatment
  2. Septic cardiac muscle damage
- Emergency dental treatment
- Dental team should be on alert and prepared to react to a cardiac emergency occurring during the dental treatment

See section on the emergency cardiac patient.

- Short, nonresistant afternoon appointments
- Patients may be taking anticoagulant/antiplatelet medications to prevent thromboembolic events
  1. Ensure that the INR is in the therapeutic range, 2.0 to 3.0
  2. Monitor blood pressure and pulse before, during, and after dental procedures
- Acceptable dose levels of local anesthetics/epinephrine for the patient with minimal cardiac muscle damage
  - Should not exceed 0.054 mg equivalent to three 1.8-mg Cartridges of 2% Lidocaine with 1:100,000 epinephrine
  - Avoid using retention cord impregnated with epinephrine

Acute MI: 6 months
- Consultation with physicians to determine patient's post-MI status
- Routine dental treatment can be performed
- Nonresistant appointments
- Patients may be taking anticoagulant/antiplatelet medications to prevent thromboembolic events
  1. Ensure that the INR is in the therapeutic range, 2.0 to 3.0
  2. Acceptable dose levels of local anesthetics/epinephrine
  - Should not exceed 0.054 mg equivalent to three 1.8-mg Cartridges of 2% Lidocaine with 1:100,000 epinephrine
  - Avoid using retention cord impregnated with epinephrine

**Arrhythmias**

Electrocardiographic evidence of abnormal atrial or ventricular electrical activity may predict symptoms and cardiovascular compromise.
1. Diaphoretic: sweating, vomiting, exaggerated gag reflex
2. Diuretics: hypotension, lichenoid drug reaction
3. Angiotensin-converting enzyme inhibitors: oral ulcers, altered taste, angioedema

Coronary Artery Bypass Graft/Coronary Artery Stents
A history of coronary artery bypass graft (CABG) or placement of stents is associated with marked accumulations of atherosclerotic plaques on the walls of the coronary arteries that compromised the delivery of oxygen to support myocardial activity. These intervention procedures have reduced the incidence of angina and improved the patient's prognostic outcomes, without lifestyle changes (diet, tobacco use, sedentary lifestyle), rebounding is still a potential problem.

Oral Health Care Considerations
- If the patient is undergoing CABG, surgery Schedule 2. Comprehensive dental evaluation
- Schedule all sources of active dental disease, caries, periodontal/pulpal pathology, nonrestorable teeth
- Intraoperative dental treatment should be deferred postoperatively until the patient is medically stable.

Antimicrobial prophylaxis is recommended during the period of nonrestorable caries of the rest, usually 6 weeks.

Heart Transplant Recipient
If time permits prior to the transplant surgery:
- Comprehensive dental evaluation
- Schedule all sources of active dental disease, caries, periodontal/pulpal pathology, nonrestorable teeth
- After the transplant surgery, consultation with the cardiologist is mandatory.
- Increased risk for infection and rejection
- Valve degeneration may occur—increased risk for life.

Oral Health Care Considerations
- Immunosuppressive drugs can have adverse oral effects:
  1. Increased potential for infection
  2. Ulcerations
  3. Candidiasis
  4. Increased risk for activation of the latent herpes virus—herpetic infection
  5. Cyclosporine—may cause gingival overgrowth

THE EMERGENCY CARDIAC PATIENT
A sudden onset of symptoms listed above in any patient with or without a prior history of cardiovascular disease can indicate a cardiac emergency. Most of the time, there will be a medical history indicating the presence of cardiovascular disease. Every patient should be prepared to assure the medical event and to provide appropriate emergency medical treatment when indicated. See Table 1-6.

Ischemic heart disease can present as either angina pectoris or myocardial infarction. Often it is difficult for the clinician to distinguish between these conditions based solely on the presenting acute clinical findings.

Angina Pectoris

Definition
Angina pectoris is a clinical term that refers to a transient chest pain of moderate intensity that results from myocardial ischemia.

Etiology
Coronary artery atherosclerosis or thrombosis obstruction of one or more of the coronary arteries results in a transient myocardial ischemic area of the available oxygen supply from the coronary vessels.
- Exercise, stress, or exertion may produce this increase in oxygen demand.
- The end result is pain.

Clinical Presentation

temporal, and submental exertion, or moderate discomfort that is relieved by rest.
- The sensation of numbness or tingling may radiate to the shoulders, arms, jaw, and/or throat.
- The most common sign of radiating pain are the left shoulder and down the medial aspect of the left arm.

Acute Myocardial Infarction

Definition
Irreversible myocardial damage and necrosis resulting from prolonged ischemic injury.

Patient with Signs and Symptoms of Cardiac Disease
A dental patient may not identify any cardiovascular disease but can present with signs, symptoms, or risk factors indicative of cardiac disease that can have important implications in the appropriate dental management of these patients (Table 1-5).

<table>
<thead>
<tr>
<th>Table 1-5</th>
<th>Signs and Symptoms of Cardiac Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sign/Symptom</td>
<td>Cardiovascular Consideration</td>
</tr>
<tr>
<td>Elevated blood pressure</td>
<td>Uncontrolled hypertension</td>
</tr>
<tr>
<td>Gross obesity</td>
<td>Risk factor for cardiovascular disease</td>
</tr>
<tr>
<td>Tobacco use/smoking</td>
<td>Risk factor for cardiovascular disease</td>
</tr>
<tr>
<td>Chest pain/palpitations</td>
<td>Myocardial infarction</td>
</tr>
<tr>
<td>Orthostatic dizziness</td>
<td>Angina pectoris</td>
</tr>
<tr>
<td>Orthostatic hypotension</td>
<td>Myocardial infarction</td>
</tr>
<tr>
<td>Dyspnea on exertion</td>
<td>Congestive heart failure</td>
</tr>
<tr>
<td>Orthopnea</td>
<td>Left-sided heart failure</td>
</tr>
<tr>
<td>Palpitations</td>
<td>Right-sided heart failure</td>
</tr>
</tbody>
</table>

Concomitant medications
- Atenolol: beta-blocker
- Lisinopril: ACE inhibitor
- Calcium channel blocker
- Digoxin: cardiac glycoside

Table 1-6: Emergency Management of Cardiac Arrest

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Begin CPR.</td>
</tr>
<tr>
<td>2</td>
<td>Activate the emergency medical system (EMS) at 911.</td>
</tr>
<tr>
<td>3</td>
<td>Administer 360 mg of atropine intravenously, maximum dose at 3 minutes initially.</td>
</tr>
<tr>
<td>4</td>
<td>Confirm that the patient has no airway obstructions.</td>
</tr>
<tr>
<td>5</td>
<td>Administer epinephrine (epinephrine), 3 mg.</td>
</tr>
<tr>
<td>6</td>
<td>Administer fentanyl (fentanyl), 0.4 mg intravenously.</td>
</tr>
<tr>
<td>7</td>
<td>Administer an intravenous anesthetic agent.</td>
</tr>
</tbody>
</table>

Cardiac Arrest

Definition
A sudden cessation of normal cardiac function with a disappearance of arterial blood pressure. This denotes either ventricular fibrillation or asystole.
- Absence of responsiveness and pulse
Hypertension

Practicing dentists will encounter many patients with undetected or poorly controlled hypertension requiring medical consultation or intervention. See Table 1-4. Failure to detect severe elevations of blood pressure can potentially result in stroke or myocardial infarction.

### Table 1-4: JNC 7 Classification of Blood Pressure in Adults

<table>
<thead>
<tr>
<th>Blood Pressure Classification</th>
<th>Systolic Blood Pressure (mm Hg)</th>
<th>Diastolic Blood Pressure (mm Hg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt; 120</td>
<td>&lt; 80</td>
</tr>
<tr>
<td>Hypertension</td>
<td>120-139</td>
<td>80-89</td>
</tr>
<tr>
<td>Stage 1 Hypertension</td>
<td>140-159</td>
<td>90-99</td>
</tr>
<tr>
<td>Stage 2 Hypertension</td>
<td>≥ 160</td>
<td>≥ 100</td>
</tr>
</tbody>
</table>


### Highlights of the JNC 7 Report

- Increased importance of elevations of systolic pressure
  - The primary focus of therapy for those 55 years of age is now reduction of systolic blood pressure (SBP) to goal, including isolated systolic hypertension.
  - Treatment for individuals under the age of 55 who will continue to focus on the diastolic blood pressure (DBP).
  - For most individuals, the current treatment target is <140/90 mm Hg.
  - For patients with diabetes mellitus or chronic kidney disease, the blood pressure goal is <130/80 mm Hg.

**Prehypertension**

- A new category called prehypertension is used to describe individuals with SBP of 120 to 139 mm Hg or a DBP of 80 to 89 mm Hg.

### Electrocardiographic Changes

- The development of hypertension is almost inevitable if a person lives long enough.
- The Framingham Heart Study indicated that individuals who are normotensive at age 55 years have a 90% lifetime risk for development of hypertension.
- Prehypertension was developed as a wake-up call for affected individuals to make appropriate lifestyle choices.
- Recommended modifications are weight reduction, dietary sodium reduction, appropriate physical activity, and moderation in alcohol consumption.
- Consumption of a diet rich in fruits, vegetables, and low-fat dairy products, such as the Dietary Approaches to Stop Hypertension (DASH) eating plan is advised.

### Benefits of Lowering Blood Pressure

- Effective antihypertensive therapy
  - Reduces the incidence of stroke by 35 to 40%
  - Reduces myocardial infarction by 20 to 25%
  - Reduces heart failure by more than 50%

### Dental Monitoring

- The JNC 7 urges all health care professionals, including dentists, to become actively involved in the detection and prevention of hypertension.
- Blood pressure readings should be taken in all new patients and for recall patients at least an annual basis.
- Individuals whose hypertension should have blood pressure assessed at each visit in which significant dental procedures are accomplished.
- Dentists should thoroughly review the health history and be familiar with all significant past and current medical problems as well as current medications.

### Use of Antihypertensive Agents

- Two to three times of warfarin with 1,000:000 epinephrine (approximately 0.036 to 0.064 mg epinephrine) is considered safe in ambulatory patients with all but the most severe cardiovascular disease.
- Intravenous fentanyl and propofol are appropriate for anxious individuals.

### Hypertension with Stage 2 Hypertension

- Patients with Stage 2 hypertension are considered candidates for all dental procedures.
- Moderate hypertension is not an independent risk factor for perioperative cardiovascular complications.
- Risk assessment is essential for all patients, especially those in whom surgical or dental procedures are anticipated.
- Isolation with antiseptic or an anesthetist agent is appropriate for anxious individuals.

### Hypertension with Stage 3 Hypertension

- Repeat blood pressure determinations to confirm initial findings and advise the patient to see his or her physician.
- Emergency care may be required for SBP > 160 mm Hg and DBP > 110 mm Hg.

### Complications of Hypertensive Treatment

- Many antihypertensive drugs can cause potential adverse reactions that dental clinicians should be aware of and recognize.
TABLE 1-9. ADVERSE REACTIONS FROM ANTIPHYLLERGIC DRUGS

<table>
<thead>
<tr>
<th>Condition/Toxicity</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orthostatic hypotension</td>
<td>Particularly in elderly on multiple antiarrhythmic medications. Always allow patient to sit upright after being placed in a sitting/standing position for prolonged periods of time.</td>
</tr>
<tr>
<td>Hypotension</td>
<td>Low pressure is a potential side effect of thiazide diuretics and prolonged use of loop diuretics. Hypotension can produce cardiovascular arrhythmias.</td>
</tr>
<tr>
<td>Atrioventricular (AV) block</td>
<td>Many medications including calcium channel blockers and other centrally acting drugs, ECG shows prolongation of refractory period.</td>
</tr>
<tr>
<td>Tachycardia</td>
<td>Several antiarrhythmic medications (amiodarone, lidocaine, procainamide, quinidine, disopyramide) may have potential to induce tachycardia that is unresponsive to cardioversion.</td>
</tr>
<tr>
<td>Premature atrial contractions</td>
<td>Premature atrial contractions may precipitate or mask overt tachyarrhythmia.</td>
</tr>
<tr>
<td>Complete heart block</td>
<td>Complete heart block may occur at any time and usually is the result of AV block.</td>
</tr>
<tr>
<td>Sudden death</td>
<td>Sudden death can occur in patients taking antiarrhythmic agents.</td>
</tr>
</tbody>
</table>

INFECTIVE ENDOCARDITIS: PROPHYLACTIC REGIMENS

Definition
Infective endocarditis (IE) is an acute or subacute infection of the valvular or endocardial surfaces of the heart.

Etiology
In the susceptible patient, platelet or fibrin vegetations develop on previously altered cardiac surfaces. Invasive dental procedures can introduce bacteria into the bloodstream, where colonization can occur on the vegetation.

Treatment
Patients with IE are hospitalized and given high-dose antimicrobial treatment to minimize cardiac damage. Despite treatment with current antibiotics, the mortality rate of IE remains between 30% and 90%.

Prevention
It should be emphasized that antibiotic prophylaxis does not prevent the development of IE in susceptible patients. It may minimize the risk. Dentists are encouraged to follow the current American Heart Association guidelines.

Oral Health Care Considerations
The dentist is responsible for identifying patients at risk for IE. To accomplish this goal, the dentist should:

- Obtain appropriate medical consultation when needed.
- Identify dental procedures likely to cause bacteremia in susceptible patients.
- Select the appropriate antimicrobial regimen.
- Eliminate all sources of infection that could serve as a reservoir for cardiac infection.

TABLE 1-10. CARDIAC OUTCOME ASSOCIATED WITH THE HIGHEST RISK OF ADVERSE OUTCOME FROM ENDOCARDITIS FOR WHICH PROPHYLAXIS WITH DENTAL PROCEDURES IS REASONABLE

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Description</th>
<th>Risk of Adverse Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac valve repair</td>
<td>Cardiac valve repair or replacement</td>
<td>High risk</td>
</tr>
<tr>
<td>Pneumonectomy</td>
<td>Pneumonectomy</td>
<td>High risk</td>
</tr>
<tr>
<td>Coronary artery bypass grafting</td>
<td>Coronary artery bypass grafting</td>
<td>High risk</td>
</tr>
</tbody>
</table>

Clinical Presentation
IE may present as an acute, subacute, or chronic disease. Common early symptoms of IE include unexplained low-grade fever, malaise, anemia, weight loss, and joint pains. These symptoms may persist for weeks prior to the diagnosis being made. As IE progresses, dyspnea, orthopnea, a palpable heart murmur, hematuria, pleuritic chest pain, and syncope may occur.

Additional Considerations for Preventing Endocarditis
- Optimal oral health should be encouraged.
- Oral irrigators and air abrasive polishing devices have been implicated in bacteremia, but the relationship to bacterial endocarditis is not well established.
- Unanticipated bleeding may occur on occasion, institute antimicrobial prophylaxis within 2 hours following the procedure. Antibiotics usually administered 1 hour after the procedure probably have no effect.
- Identifiable patients may develop bacteria from whom caused by ill-fitting dentures. Denture wearers should be encouraged to have periodic examinations to determine if discomfort develops. New dentures should be evaluated periodically to correct any problems that may cause bacterial colonization.

CEREBROVASCULAR DISEASE

Definition
Strokes are a group of disorders involving sudden, focal interruption of cerebral blood flow that may result in neurologic deficit.

- Ischemic stroke (80%) results from thrombosis or embolism and is sometimes referred to as a "brain attack."
- Hemorrhagic stroke (20%) results from a vascular rupture producing a subarachnoid or intracerebral hemorrhage.

In Western countries, cerebral accidents are the third most common cause of death and the most common cause of neurologic disability.

Etiology
The occlusion of cerebral blood flow by emboli or thrombus can result in neurologic deficits.

- Anterior circulation stroke: hemispheric symptoms.
- Posterior circulation stroke: lateral deficits that affect the level of consciousness.

Chronology of Strokes
- Transient ischemic attack (TIA) is focal brain ischemic producing sudden neurologic deficits that last < 1 hour.
- TIA's are common in the middle aged and elderly.
- The presence of TIA's increases the risk of a stroke.
- Stroke is suspected when there are sudden neurologic deficits consistent with brain damage.

TABLE 1-12. REGIMENS FOR A DENTAL PROCEDURE

<table>
<thead>
<tr>
<th>Situation</th>
<th>Agent</th>
<th>Regimen - Single Dose 30-60 minutes before procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral pain to take oral medication</td>
<td>Amoxicillin</td>
<td>2 gm</td>
</tr>
<tr>
<td>Algines to prevent or diminish oral pain</td>
<td>Metronidazole</td>
<td>2 gm or 2.5 gm or 5 gm or 10 gm or 20 gm</td>
</tr>
<tr>
<td>Algines to prevent or diminish oral pain</td>
<td>Cloxacillin</td>
<td>2 gm or 2.5 gm or 5 gm or 10 gm or 20 gm</td>
</tr>
<tr>
<td>Algines to prevent or diminish oral pain</td>
<td>Clindamycin</td>
<td>400 mg or 800 mg</td>
</tr>
<tr>
<td>Algines to prevent or diminish oral pain</td>
<td>Cephalexin</td>
<td>25 mg or 50 mg or 100 mg or 150 mg</td>
</tr>
<tr>
<td>Algines to prevent or diminish oral pain</td>
<td>Clindamycin</td>
<td>250 mg or 500 mg or 1000 mg or 1500 mg</td>
</tr>
<tr>
<td>Algines to prevent or diminish oral pain</td>
<td>Fluoroquinolone</td>
<td>250 mg or 500 mg or 1000 mg or 1500 mg</td>
</tr>
</tbody>
</table>

*See also section 18.2.1.1 for more information on prophylaxis in non-immunosuppressed adults with congenital heart disease.
Table 1-13. Risk Factors Associated with Stroke

<table>
<thead>
<tr>
<th>Nonmodifiable Risk Factors</th>
<th>Modifiable Risk Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of patient</td>
<td>Hypertension</td>
</tr>
<tr>
<td>Male gender</td>
<td>Hyperlipidemia</td>
</tr>
<tr>
<td>History of TIA</td>
<td>Diabetes mellitus</td>
</tr>
<tr>
<td>Hypertension</td>
<td>Obesity</td>
</tr>
<tr>
<td>Smoking</td>
<td></td>
</tr>
<tr>
<td>History of stroke</td>
<td></td>
</tr>
<tr>
<td>Higher prevalence in African Americans</td>
<td></td>
</tr>
<tr>
<td>Genetic factors</td>
<td></td>
</tr>
<tr>
<td>Family history of stroke</td>
<td></td>
</tr>
</tbody>
</table>

Stroke Risk Factors

The risk factors listed in Table 1-13 may increase the likelihood of a patient suffering a stroke or TIA and/or significantly increase the risk for recurrent stroke or TIA.

Oral Health Care Considerations

- Obtain a comprehensive medical history.
- Identify the patient’s medications (anticoagulant/antiplatelet medications).
- Determine and document the patient’s INR (if taking anticoagulants, Coumadin/warfarin).
- Identify the patient’s risk factors for TIA or stroke.
- Document and monitor the patient’s blood pressure and pulse.
- Evaluate the patient’s ability to perform effective oral hygiene activities, such as toothbrushing and flossing.
- Obtain profound anesthesia:
  - 2% lidocaine with 1:100,000 epinephrine, no more than three Carpsules
  - Xylocaine and with epinephrine
  - Minimize stress at the dental appointment.
  - Minimal use of central nervous system depressant analgesic agents.

Table 1-14. Anticoagulant/Antiplatelet Medications

<table>
<thead>
<tr>
<th>Medication</th>
<th>Mode of Action</th>
<th>Laboratory Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warfarin (Coumadin)</td>
<td>INH inhibition of platelet aggregation</td>
<td>INH bleeding time</td>
</tr>
<tr>
<td>Aspirin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dipyridamole (Persantine)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apixaban</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1-15. Emergency Care for the Stroke Patient

- If the dental patient demonstrates clinical signs and symptoms consistent with a transient ischemic attack or stroke, IMMEDIATELY STOP THE DENTAL TREATMENT.
- Activate the emergency medical system: Call 911 and document the time of the call.
- Be prepared to provide basic life support procedures.
- Place the patient in a comfortable position.
- Monitor the patient’s vital signs.
- Provide oxygen to the patient.
- When emergency medical personnel arrive:
  - Provide them with information pertaining to the emergency
  - Monitor Vital signs
  - Observe administration of drugs and flow rates
  - Document the occurrence of the patient’s dental record:
    - Time of emergency
    - All dental office activities related to the emergency
    - Arrival time of emergency personnel
    - Emergency personnel medical procedures
    - Time of departure for the emergency room.