

Hypertension Protocols

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Rationale:

Hypertension, also known as high blood pressure, is one of the most frequently encountered systemic diseases in clients visiting dental clinics, due to its high prevalence worldwide. Hypertension is a major risk factor associated with many cardiovascular diseases and plays a significant role in the progression of congestive heart failure, stroke, heart attacks, kidney failure, and premature death. Factors that contribute to the prevalence of hypertension are smoking, stress, drugs, alcohol, nutrition, diabetes, obesity, use of oral contraceptives, and limited physical activity.

Hypertension is defined as a persistent elevation in blood pressure. More specifically, people are considered hypertensive if their systolic blood pressure (SBP) is greater than or equal to 140 mm Hg, their diastolic blood pressure (DBP) is greater than or equal to 90 mm Hg, or if they are taking antihypertensive medication.

The importance of the routine measurement of blood pressure cannot be overemphasized. Blood pressure measurement in the dental office is an effective screening tool that alerts the client, oral health professional and physician to an unsuspected potential problem.

Dental hygienists are in a unique position to assess blood pressure and increase a client's awareness about the risk associated with hypertension since they have regular contact due to frequent care intervals. Therefore, dental hygienists have a great opportunity to educate their clients on the health risks associated with hypertension, recommend appropriate lifestyle modifications, and promote healthy lifestyles.

Blood Pressure Protocols

Determination of blood pressure for dental hygiene appointments is an essential step in the assessment phase of care.

It is recommended that blood pressure be taken under these circumstances:

- ***All new clients aged 3+:*** The American Heart Association (2014) suggests that blood pressure should begin to be monitored regularly at the age of 3. Children's blood pressure values are dependent on gender, age, and height.
- ***Annually for every client***
- ***Each appointment for clients with a history of hypertension:*** Clients with known hypertension and/or on hypertensive medications should be monitored throughout each dental visit during which complex procedures are performed, since elevations of blood pressure can increase a patient's risk of experiencing a stroke or myocardial infarctions in the dental chair (Thompson et al., 2007; Herman et al., 2004). Furthermore, local anesthetics that contain epinephrine or other vasoconstrictors can increase blood pressure or the development of an arrhythmia, which is dangerous to patients with hypertension (Gurenlian, 2007; Thompson et al., 2007).

Oral Management Implications:

A primary concern in dental hygiene management of a client with hypertension is that during the course of treatment a sudden, acute elevation of blood pressure might occur, potentially leading to a serious outcome, such as heart attack or stroke. Emotional stress and pain stimulate the sympathetic nervous system, which can result in elevated blood pressure.

The procedural risk associated with an adverse cardiovascular outcome from both non-invasive and invasive dental hygiene procedures is very low. The risk imposed by uncontrolled blood pressure (defined as 180/110 or greater in most persons) constitutes a minor risk in terms of dental hygiene cardiovascular risk; however, blood pressure should be brought under control before elective procedures or surgery are performed.

Is the initiation of non-invasive dental hygiene procedures (OHI, taking an impression, fitting a mouthguard, etc) contra-indicated?

No, unless systolic blood pressure ≥ 180 mm Hg and/or diastolic blood pressure ≥ 110 mm Hg OR there are warning symptoms/signs in the hypertensive patient/client at lower levels of BP; e.g., severe headache, blurred vision, shortness of breath, nosebleeds, nausea/vomiting, chest pain, or seizures.

- ***Is medical consult advised?***

No, unless systolic BP ≥ 130 mm Hg and/or diastolic BP ≥ 85 mm Hg; in patients/clients with diabetes, medical consult is advised at diastolic BP ≥ 80 mm Hg.

Is the initiation of invasive dental hygiene procedures (scaling, root planing, including curetting surrounding tissue) contra-indicated?

- No, unless systolic blood pressure ≥ 180 mm Hg and/or diastolic blood pressure ≥ 110 mm Hg OR there are warning symptoms/signs in the hypertensive patient/client at lower levels of BP; e.g., severe headache, blurred vision, shortness of breath, nosebleeds, nausea/vomiting, chest pain, or seizures. In patients/clients with risk factors such as myocardial infarction, angina pectoris, high coronary disease risk, recurrent stroke, diabetes mellitus, and renal disease, invasive procedures should not be performed if systolic BP ≥ 160 mm Hg and/or diastolic blood pressure ≥ 100 mm Hg. (See attached tables for further details.)

- ***Is medical consult advised?*** See above.
- ***Is medical clearance required?*** No
- ***Is antibiotic prophylaxis required?*** No
- ***Is postponing treatment advised?*** No, unless BP is at contra-indication levels (see above) or there are other concerns that invasive procedures may significantly elevate patient/client blood pressure (e.g., missed anti-hypertensive medications), which should prompt medical consultation prior to the performing of invasive procedures. Dental hygiene procedures should be deferred for any patient/client who has uncontrolled hypertension (BP of 180/110 mm Hg or higher in persons without a history of other cardiovascular risk factors; 160/100 mm Hg or higher with a history of other risk factors). Asymptomatic patients/clients with BP less than 180/110 mm Hg (or 160/100 in patients/clients with other cardiovascular risk factors) can receive any indicated dental hygiene treatment; however, persons with elevated blood pressures (particularly 140/90 and higher in most people) should be encouraged to see their physician for investigation and optimal management.

Two tables have been provided to assist in the proper management of hypertension

1. TABLE 1: Blood Pressure Ranges and Appropriate Care for Adults
2. TABLE 2: Blood Pressure Values Requiring Further Evaluation, According to Age and Gender

TABLE 1: Blood Pressure Ranges for Adults

Category	Systolic	Diastolic	Dental Hygiene care indicated
Normal	<120	<80	Proceed with dental hygiene care
Elevated	120-129	<80	<ul style="list-style-type: none"> • Use hypertension protocol • Recommend evaluation by physician. • Record readings for client to show physician • Proceed with dental hygiene care
Hypertension Stage 1	130-159	80-89	<ul style="list-style-type: none"> • Position supine and retake BP after 5 minutes. • Use hypertension protocol • Recommend evaluation by physician. • Record readings for client to show physician • Proceed with dental hygiene care
Hypertension Stage 2	=/>140	=/>90	<ul style="list-style-type: none"> • Position supine and retake BP after 5 minutes. • Use hypertension protocol • Recommend evaluation by physician. • Record readings for client to show physician • Proceed with dental hygiene care
Hypertensive Urgency/ Emergency	>180	>110	<ul style="list-style-type: none"> • Position supine and retake BP after 5 minutes. • Use hypertension protocol • Recommend evaluation by physician. • Record readings for client to show physician • Proceed with dental hygiene care only if BP <180/110 after BP is retaken • If >180/110 then immediately refer clients to the physician if there is no history of myocardial infarction, angina or stroke and markedly elevated blood pressure (SBP > 180 mm Hg or DBP > 110 mm Hg) • If >180/110 then immediately refer clients to the hospital if there is a history of myocardial infarction, angina, or stroke and markedly elevated blood pressure (SBP >

			180 mm Hg or DBP > 110 mm Hg) <ul style="list-style-type: none"> • Immediately refer all clients to the hospital if there is dangerously elevated blood pressure (SBP > 210 mmHg or DBP > 120 mm Hg)
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Adapted from:

American Heart Association. (2017). Guidelines for the prevention, detection, evaluation and management of high blood pressure in adults. Retrived from <http://hyper.aha.journals.org/lookup/suppl/doi:10.1161/HYP.000000000000065/-/DCI>.

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Zahedi, S., Marciniak, R. (2012). The hypertensive patient. (A review of the latest joint national committee on prevention, detection, evaluation and treatment of hypertension as it applies to the dentist.) Oral Health, 102 (2), 42-46.

TABLE 2: Blood Pressure Values Requiring Further Evaluation, According to Age and Gender

Age, years	Blood Pressure, mm Hg			
	Male		Female	
	Systolic	Diastolic	Systolic	Diastolic
3	100	59	100	61
4	102	62	101	64
5	104	65	103	66
6	105	68	104	68
7	106	70	106	69
8	107	71	108	71
9	109	72	110	72
10	111	73	112	73

Age, years	Blood Pressure, mm Hg			
	Male		Female	
	Systolic	Diastolic	Systolic	Diastolic
11	113	74	114	74
12	115	74	116	75
13	117	75	117	76
14	120	75	119	77
15	120	76	120	78
16	120	78	120	78
17	120	80	120	78
≥18	120	80	120	80

*Used with permission: Kaelber, D.C., Pickett, F. (2009). Simple table to identify children and adolescents needing further evaluation of blood pressure. *Pediatrics*. 123:6

These values represent the lower limits for **abnormal blood pressure ranges, according to age and gender. Any blood pressure readings equal to or greater than these values represent blood pressures in the pre-hypertensive, stage 1 hypertensive, or stage 2 hypertensive range and should be further evaluated by a physician.

Types of Antihypertensive Medications

Often taken in combinations, antihypertensive medications comprise of:

1. Diuretics, which remove excess sodium and fluid to reduce the amount of water and therefore the volume of fluid circulating in the blood; these include
 - amiloride and hydrochloride (Moduretic®)
 - bumetanide (Bumex®)
 - chlorthalidone (Thalitone®)
 - ethacrynic acid (Edecrin®)
 - furosemide (Lasix®)
 - hydrochlorothiazide (HydroDiuril®, Microzide®)
 - indapamide (Lozol®)
 - metolazone (Mykrox®, Zaroxolyn®)
 - spironolactone (Aldactone®)
 - torsemide (Demadex Oral®)
 - triamterene (Dyrenium®)
2. Beta blockers, which block the effects of adrenaline, thereby reducing the heart rate and the force of the heart pumping action; these include
 - acebutolol (Sectral®)

- atenolol (Tenormin®)
 - betaxolol (Kerlone®)
 - bisoprolol (Zebeta®)
 - carvedilol (Coreg®)
 - labetalol (Normodyne®, Trandate®)
 - metoprolol (Lopressor®)
 - nadolol (Corgard®)
 - penbutolol (Levator®)
 - propranolol (Inderal®)
 - timolol (Blocadren®)
3. Calcium channel blockers, which inhibit blood-vessel constriction by blocking calcium from entering the cells of the heart and blood vessel, or by reducing the force with which the blood is pumped, thereby reducing the blood pressure; these include
- amlodipine (Norvasc®)
 - diltiazem (Cardizem®)
 - felodipine (Plendil®)
 - isradipine (DynaCirc®)
 - nicardipine (Cardene®)
 - nifedipine (Adalat®, Nifedical®, Procardia®)
 - nisoldipine (Sular®)
 - verapamil (Isoptin®)
4. Angiotensin-converting enzyme (ACE) inhibitors, which inhibit blood-vessel constriction by blocking production of angiotensin II, a substance that constricts blood vessels; these include the following
- benazepril (Lotensin®)
 - captopril (Capoten®)
 - enalapril (Vasotec®)
 - fosinopril (Monopril®)
 - lisinopril (Prinivil®, Zestril®)
 - moexipril (Univasc®)
 - quinapril (Accupril®)
 - ramipril (Altace®)
 - trandolapril (Mavik®)
5. Angiotensin II Receptor blockers, which are similar to ACE inhibitors, but block angiotensin's narrowing action on blood vessels; these include
- candesartan (Atacand®)
 - irbesartan (Avapro®)
 - losartan (Cozaar®)
 - telmisartan (Micardis®)
 - valsartan (Diovan®)
6. Alpha blockers, which relax certain muscles and combat the constricting effect of noradrenaline on blood vessels; these include
- alfuzosin (Uroxatral®)
 - doxazosin (Cardura®)
 - prazosin (Minipress®)
 - tamsulosin (Flomax®)
 - terazosin (Hytrin®)

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