



Taking Blood Pressure in the Dental Office

Introduction

Blood pressure is one component of a patient's vital signs. The others include heart rate and rhythm, respiratory rate, temperature, height and weight.¹ During medical emergency situations it is essential that a dentist manage and monitor a patient's vital signs until help arrives. Of all the vital signs, only blood pressure measurement requires special equipment and continuous practice to be carried out effectively. It is a skill all dental professionals should master, and since it is not commonly covered by the CPR or BLS curriculum², the objective of this article is to present the appropriate steps involved in taking manual blood pressure of dental patients.

Methods of Measuring Blood Pressure

In medical and dental out-patient settings, non-invasive palpation and auscultatory methods are the two most commonly used techniques. The sphygmomanometer (from the Greek *sphymus* for 'pulse'; 'manometer' is a pressure meter), also known as the blood pressure cuff, is required for both techniques (Figure 1). It includes an inflatable cuff connected to an inflating bulb with a needle valve and a pressure registering system. There are three types of sphygmomanometers:

- **Mercury** — the standard for blood pressure measurement
- **Aneroid** — more lightweight and portable, and the most common
- **Automatic** — all components are contained in one unit, to minimize human error. This device is a good option for people with hearing or vision loss.

Detailed comparison of these instruments may be found on the American Heart Association's web site.³ For an accurate blood pressure measurement, proper cuff size and snug fit are important — the width of the blood pressure cuff should be 20 to 50 percent greater than the diameter of the patient's upper arm (Figure 2).

A stethoscope (Figure 3) is required for the auscultatory method. It consists of a pair of angled earpieces connected to a chest piece. The earpiece should be angled forward for the best fit. The chest piece is composed of a flat diaphragm and sometimes a cup-shaped bell. The



Figure 1.

diaphragm is commonly used as it transmits high pitch sounds efficiently while the bell transmits low pitch sounds.

Palpation Method

It is recommended that the patient be sitting in a chair, with the lower arm supported. For a patient with unknown baseline blood pressure, the palpation method is used to estimate the patient's **systolic** pressure: the highest blood pressure, measured in the arteries and occurring with each heartbeat. This method depends on tactile palpation of peripheral pulses and does not require a stethoscope.

Technique

1. Locate the patient's peripheral radial pulse by palpating the wrist. The heart rate can be noted at the same time.
2. Wrap the sphygmomanometer firmly around the patient's upper arm one inch above the elbow crease (the antecubital fossa — Figure 4) with the 'artery' indicator pointing to patient's brachial artery.
3. Close the valve on the inflating bulb of the sphygmomanometer by turning it fully clockwise. The manometer can usually be clipped onto the blood pressure cuff to free the operator's hand for pulse detection (Figure 5).
4. Inflate the blood pressure cuff until the radial pulses are no longer felt, and then inflate a further 20-30 mm Hg to ensure that the blood flow is occluded.
5. Slowly reduce the pressure at a rate of two-three mm Hg per second by turning the valve on the inflating bulb counterclockwise. When a pulsation is detected, the corresponding reading is the palpable systolic pressure.
6. Note the estimated systolic pressure and then fully release the pressure of the cuff.



Figure 2.

Width of cuff should be 20-50% wider than the patient's upper arm.



Figure 3.

Stethoscope, with diaphragm facing upwards.

Because of the insensitivity of touch and the delay between flow under the cuff and distal pulsations, the palpation method does not provide a diastolic pressure and it tends to underestimate systolic pressure.

Auscultatory Method

The auscultatory method can be used directly to measure blood pressure if the baseline systolic pressure is already known. This method provides a reading of both systolic and diastolic pressure, and should be taken with the patient seated with the lower arm supported.

Technique

1. Wrap the deflated blood pressure cuff firmly around patient's upper arm about one inch above the antecubital fossa.
2. Place the chest piece of the stethoscope in the space between the cuff and crease of the elbow, on top of the brachial artery (Figure 6).
3. Inflate the cuff quickly to about 20-30 mm Hg higher than the estimated systolic pressure.
4. Reduce the pressure slowly at a rate of two-three mm Hg per second. At some point the operator will hear, through the stethoscope, a tapping sound with each heartbeat. The reading on the pressure gauge at that point indicates the systolic pressure. These tapping sounds are called Korotkoff sounds and are produced by the turbulent flow of blood through the underlying artery, which has been partially collapsed by the inflated cuff.
5. As the cuff pressure is lowered, the tapping sounds become weaker and will eventually disappear. The pressure reading at this point is the diastolic pressure. At readings below the diastolic pressure, circulation through the artery returns to normal laminar flow, which produces little vibrations of the arterial wall and therefore, no sounds.

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Figure 4.

BP cuff positioned one inch above the antecubital fossa. Note operator's left hand palpating the brachial pulse and the right hand palpating the radial pulse.



Figure 5.
Manometer attached to the BP cuff.



Figure 6.
Stethoscope's chest piece positioned between the BP cuff and the antecubital fossa.

Significance of Blood Pressure

According to data from the American Heart Association, blood pressure higher than 120/80 mm Hg is classified as pre-hypertension or hypertension (Table 1). If a patient's blood pressure is higher than 140/80 or lower than 95/50mmHg, does this mean that the patient has hypertension or hypotension? The answer is *maybe yes* or *maybe no*.

Blood pressure for a normal adult varies, to a certain extent, depending on the patient's physiological as well as emotional status. A blood pressure of 90/50 mm Hg may be normal for a young and calm female patient, yet the same reading may be a symptom of vasovagal syncope for another patient who has just lost consciousness before or after the administration of a local anesthetic. It is difficult to define a specific pressure value below which the patient may be said to have hypotension. Nevertheless, a minimum critical pressure in the circulation is needed to supply the vital organs with blood and oxygen. If the blood pressure and blood flow falls sufficiently, perfusion of the central nervous system (especially the brain) and other major organs will suffer, causing lightheadedness, dizziness, weakness and fainting. In general, most individuals will be symptomatic if their systolic blood pressure falls below 80 mm Hg and almost everyone will be affected if the systolic pressure falls below 60 mm Hg.

Symptomatic hypotension is a medical emergency requiring quick diagnosis and effective management. Differential diagnosis of hypotension in a dental setting may include: postural hypotension, vasovagal syncope or hypoglycemia. Less common etiologies include anaphylaxis, acute adrenal insufficiency, cerebral vascular accident (stroke) and myocardial infarction.

On the other hand, persistently elevated blood pressure is abnormal and detrimental to any person's well-being. In a dental setting, a patient's blood pressure may be elevated due to factors such as pain and anxiety about dental treatment. Therefore, baseline vital signs should be taken during a visit before the start of dental treatment. The purpose of taking a patient's blood pressure in a dental office is not to diagnose hyper- or hypotension. A diagnosis of high blood pressure is based on the average of two or more readings taken at each of two or more visits after an initial screening.⁴ Nonetheless, abnormally high or low blood pressure serves as a basis for dentists to advise patients to seek further or immediate medical man-

Table 1.
AHA Classification of Blood Pressure
for Adults 18 years and Older⁴

Category	Systolic (mmHg)		Diastolic (mmHg)
Normal *	<120	and	<80
Pre-hypertension	120-139	Or	80-89
Hypertension			
Stage 1	140-159	Or	90-99
Stage 2	≥ 160	Or	≥ 100

* Unusually low readings should be evaluated for clinical significance

agement. For example, a patient suffering severe orofacial pain may present with a blood pressure higher than 140/80 mm Hg. In such a case, emergency dental treatment is warranted to alleviate discomfort. If this elevated blood pressure persists at subsequent appointments, without apparent dental or emotional cause, elective dentistry should be delayed until the patient's blood pressure is appropriately managed.

During dental treatment, hypertension may also correlate with a patient's pain perception and level of anxiety. This can typically be managed with stress reduction strategies and additional local anesthetic. However, if the patient also displays signs of distress and/or chest pain, then a systemic cause of hypertension must be considered. The importance of a complete medical history and baseline vital signs for each patient cannot be over-emphasized. If a medical emergency occurs, these are essential data that may help the dentist to correctly diagnose and quickly manage the patient's condition.

Conclusion

With practice, blood pressure measurement is a quick and easy procedure that can be mastered by any dental team member. One blood pressure reading by itself may have little diagnostic value, but several readings, taken during different times and in different situations, reflect the cardiovascular and physiologic status of the patient. Since medical emergencies occur unexpectedly, it is recommended that dental personnel take blood pressure for each patient during initial or regular recall appointments in order to obtain a complete record of the patient's baseline vital signs. 

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