Procedures

The "gold standard" for assessing blood pressures is the direct measurement of intra-arterial BP. This method is invasive and requires catheterization. Therefore, in clinical or field settings, BP is typically measured indirectly by auscultation using a stethoscope and sphygmomanometer consisting of a BP cuff and either an anaeroid or mercury column manometer. A mercury column manometer is preferable because anaeroid manometers lose their calibration more easily. Technicians with impaired hearing can use an anesthesiologist's stethoscope, which magnifies sound. Alternatively, you can measure resting BP with automated devices. The validity of these devices for measuring exercise blood pressures, however, has not yet been firmly established (Griffin,Roberts,and Heyward 1997). Also, you can obtain an estimate of resting BP using the palpation method described later. These estimates are generally within 10mmHg of auscultatory values (Reeves 1995).

To check the accuracy of an anaeroid manometer against a mercury unit, follow the procedures suggested by Reeves (1995):

- Disconnect the bulbs of both cuffs and reconnect the bulb and dial of the anaeroid unit to the cuff of the mercury unit.
- Roll the cuff up loosely, securing the Velcro strips, and hold the cuff steady while gradually inflating it.
- Hold the dial of the anaeroid manometer close to the mercury column and compare the two readings at several pressures throughout the range of the measurement scale (e.g., 40 to 220 mmHg). If the anaeroid and mercury manometer pressures differ by more than 2 to 3 mmHg, send the anaeroid manometer to the manufacturer for adjustment.

Measure resting BP in the supine and exercise (sitting or standing) positions prior to testing (ACSM 1995). The client should be wearing a short-sleeved or sleeveless garment and be seated in a quiet room. Take BP measurements rapidly, and completely deflate the cuffs for at least 30 seconds between consecutive readings. For more accurate results, obtain two or three determinations of pressure from each arm.

Proper cuff size is important, because a large cuff on a small arm causes low readings. Cuffs for average-sized adults are usually 12 to 14 cm (4.7 to 5.5 in) wide and 30 cm (11.8 in) in length. Smaller cuffs for children and larger cuffs for obese persons are also available. You should also use the larger cuff to measure BP of individuals with well-developed arm muscles.

To measure resting BP (seated position), use the following recommended procedures (Reeves 1995):

### RESTING BLOOD PRESSURE MEASUREMENT

1. Seat the client in a quiet room for at least five minutes. The client's bare arm should be resting on a table so that the middle of the arm is at the level of the heart.

2. Estimate the client's arm circumference or measure it at the midpoint between the acromion process of the shoulder and the olecranon process of the elbow (see appendix D.5, description for measuring arm circumference) using an anthropometric tape measure. The bladder of the cuff should encircle 80% of an adult's arm and 100% of a child's arm.

3. Palpate the brachial artery pulse on the anteromedial aspect of arm below the belly of the biceps brachii and 2 to 3 cm (1 inch) above the antecubital fossa. Wrap the deflated cuff firmly around the upper arm so that the midline of the cuff is over the brachial artery pulse. The lower edge of the cuff should be approximately 2.5 cm (1 inch) above the antecubital fossa. If the cuff is too loose, BP will be overestimated. Avoid placing the cuff over clothing, and if the shirt sleeve is rolled up, make certain that it is not occluding the circulation.

4. Position the manometer so that the center of the mercury column or dial is eye level and the cuff's tubing is not overlapping or obstructed.

5. Locate and palpate the radial pulse (see page 23 for anatomical description of this site), close the valve of the blood pressure unit completely by screwing it away from you, and rapidly inflate the cuff to 70 mmHg. Then slowly increase the pressure in 10 mmHg increments while palpating the radial pulse and note when the pulse disappears (estimate of systolic BP). Partially open the valve by unscrewing it toward you to slowly release the pressure at a rate of 2 to 3 mmHg per second, and note when the pulse reappears (estimate of diastolic BP). Fully open the valve to completely release the pressure in the cuff.