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About Your Blood Pressure and Pulse

There are two important vital statistics that doctors use to assess the immediate health of your heart: blood pressure and pulse. These “numbers” fluctuate as your heart’s condition changes.

Blood pressure is taken using an instrument called a sphygmomanometer which consists of a cuff that can be filled with air, a hollow rubber bulb that pumps the air, and a glass tube containing a column of mercury. After placing the cuff around the upper arm, the doctor (or person taking the blood pressure), holds a stethoscope over the artery just below the cuff. The pulse can be heard. Next, air is pumped into the cuff, stopping the flow of blood through the artery. Then, air is slowly let out of the cuff, letting the blood flow again. The pressure with which the blood begins to flow represents the pressure of the heart’s contraction (known as the systolic phase). More air is let out of the cuff, muffling the sound, and representing the pressure of the heart’s relaxation (known as the diastolic phase).

These two phases are measured using two numbers which stand for millimeters. The column of mercury in the glass tube rises and falls with the flow of the blood. The height of the column is measured in millimeters. The first number, which is higher, is taken when the heart beats during the systolic phase. The second number is taken when the heart relaxes during the diastolic phase. Normal blood pressure ranges from 110 to 150 millimeters (as the heart beats) over 60 to 80 millimeters (as the heart relaxes). Patients with readings that exceed either of these ranges are treated for hypertension (high blood pressure). Readings below either of these ranges indicate hypotension (low blood pressure) which can indicate malfunction or the pancreas in a condition of low blood sugar, or weakness of the adrenal glands (two small glands located above the kidneys).

Average Blood Pressure Rates:

- Systolic 110 to 150
- Diastolic 60 to 80
Taking Your Pulse

Your pulse is taken by touching one of several “pulse points” located on your body. These spots are areas where the arteries are near enough to the surface of the skin that the movement of blood through them can be felt. You can actually feel your artery expand and contract. Since the artery keeps pace with the heart, doctors can measure heart rate by counting the contractions of the artery.

Average Pulse Rates Adult

- Males about 72
- Adult Females 76 to 80
- Newborns up to 140
- Children about 90
- Elderly 50 to 65

How to Take Your Blood Pressure

1. Have paper and your graph at hand for immediate recording of the pressure.

2. Seat the subject in a quiet, calm environment with his or her bared arm resting on a standard table or other support so the midpoint of the upper arm is at the level of the heart.

3. Estimate by inspection or measure with a tape the circumference of the bare upper arm at the midpoint between the acromion and olecranon process (between the shoulder and elbow) and select an appropriately sized cuff. The bladder inside the cuff should encircle 80% of the arm in adults and 100% of the arm in children less than 13 years old. If in doubt, use a larger cuff. If the available cuff is too small, this should be noted.

4. Palpate the brachial artery and place the cuff so that the midline of the bladder is over the arterial pulsation, then wrap and secure the cuff snugly around the subject’s bare upper arm. Avoid rolling up the sleeve in such a manner that it forms a tight tourniquet around the upper arm. Loose application of the cuff results in overestimation of the pressure. The lower edge of the cuff should be 1 inch (2 cm) above the antecubital fossa (bend of the elbow), where the head of the stethoscope is to be placed.

5. Place the manometer so the center of the mercury column or aneroid dial is at eye level and easily visible to the observer and the tubing from the cuff is unobstructed.

6. Inflate the cuff rapidly to 70 mm Hg, and increase by increments of 10 mm Hg while palpating the radial pulse. Note the level of pressure at which the pulse disappears and subsequently reappears during deflation. This procedure, the palpatory method, provides a necessary preliminary approximation of the systolic blood pressure to ensure an adequate level of inflation when the actual, auscultatory measurement is made. The palpatory method is particularly useful to avoid underinflation of the cuff in patients with an auscultatory gap and overinflation in those with very low blood pressure.

7. Place the earpieces of the stethoscope into the ear canals, angled forward to fit snugly. Switch the stethoscope head to the low-frequency position (bell). The setting can be confirmed by listening as the stethoscope head is tapped gently.

8. Place the head of the stethoscope over the brachial artery pulsation just above and medial to the antecubital fossa but below the lower edge of the cuff, and hold it firmly in place, making sure that the head makes contact with the skin around its entire circumference. Wedging the head of the stethoscope under the edge of the cuff may free up one hand but results in considerable extraneous noise.

9. Inflate the bladder rapidly and steadily to a pressure 20 to 30 mm Hg above the level previously determined by palpa-
tion, then partially unscrew (open) the valve and deflate the bladder at 2 mm/s while listening for the appearance of the
Korotkoff sounds.

10. As the pressure in the bladder falls, note the level of the pressure on the manometer at the first appearance of repetitive
sounds (Phase I) and at the muffling of these sounds (Phase IV) and when they disappear (Phase V). During the period
the Korotkoff sounds are audible, the rate of deflation should be no more than 2 mm per pulse beat, thereby compensating
for both rapid and slow heart rates.

11. After the last Korotkoff sound is heard, the cuff should be deflated slowly for at least another 10 mm Hg, to ensure
that no further sounds are audible, then rapidly and completely deflated, and the subject should be allowed to rest for at
least 30 seconds.

12. The systolic (Phase I) and diastolic (Phase V) pressures should be immediately recorded, rounded off (upwards) to the
nearest 2 mm Hg. In children, and when sounds are heard nearly to a level of 0 mm Hg, the Phase IV pressure should
also be recorded. All values should be recorded together with the name of the subject, and the date and time of the mea-
urement, the arm on which the measurement was made, the subject’s position, and the cuff size (when a nonstandard size
is used).

13. The measurement should be repeated after at least 30 seconds, and the two readings averaged. In clinical situations ad-
ditional measurements can be made in the same or opposite arm, in the same or an alternative position.


Blood Pressure Monitoring at Home

Why should I measure my blood pressure at home and keep a record of it?
Measuring your blood pressure at home and keeping a record of the measurements will show you and your doctor how
much your blood pressure changes during the day. Your doctor can use the measurements to see how well your medicine is
working to control your high blood pressure.

What equipment do I need to measure my blood pressure?
To measure your blood pressure at home, you can use either an aneroid monitor or a digital monitor. The aneroid moni-
tor has a dial gauge that is read by looking at a pointer. The cuff is inflated by hand, by squeezing a rubber bulb. Digital
monitors have either manual or automatic cuffs. The blood pressure reading flashes on a small screen. Choose the type of
monitor that best suits your needs.

What are the pros and cons of the aneroid monitor?
One advantage of the aneroid monitor is that it can easily be carried from one place to another. Also, the cuff for the de-
vice has a built-in stethoscope, so you don't need to buy a separate stethoscope. It's also easier to manage this way. The unit
may have a special feature that makes it easier to put the cuff on with one hand. In addition, the aneroid monitor costs less
than digital monitors. Aneroid monitors range in price from about $20 to $30.

The aneroid monitor also has some disadvantages. First, it is a complicated device that can easily be damaged and become
less accurate. The device is also difficult to use if it doesn't have the special feature – a metal ring – that makes it easier to
put the cuff on. In addition, the rubber bulb that inflates the cuff may be difficult to squeeze. This monitor may not be ap-
propriate for hearing-impaired people, because of the need to listen to heart sounds through the stethoscope.

What are the pros and cons of the digital monitor?
Because the digital monitor is automatic, it is the most popular blood-pressure measuring device. The blood pressure is
easy to read, because the numbers are shown on a screen. Some electronic monitors have a paper printout that gives you a
Monitoring Your Blood Pressure

record of the blood pressure reading.

The digital monitor is easier to use than the aneroid unit. It has a gauge and stethoscope that are one unit, and the num-
bers are easy to read. It also has an error indicator, and deflation is automatic. Inflation of the cuff is either automatic or
manual, depending on the model. This blood pressure monitoring device is good for hearing-impaired patients, since there
is no need to listen to heart sounds through the stethoscope

A disadvantage of the digital monitor is that the accuracy is changed by body movements or an irregular heart rate. In ad-
dition, the monitor requires batteries. Some models are designed for use with the left arm only. This may make them hard
for some patients to use. Finally, some digital monitors are expensive. They start in price at $40 for semiautomatic models.
Fully automatic models start at $65, and can cost hundreds of dollars.

Can I use a finger/wrist blood pressure monitor?
Tests have shown that finger/wrist devices do not measure blood pressure very accurately. They are extremely sensitive to
position and body temperature, and are more expensive (more than $100) than other monitors.

Features to look for in a blood pressure monitor
• The right cuff size is very important. Ask your doctor, nurse or pharmacist to tell you the cuff size you need, based on
the size of your arm. Blood pressure readings will be wrong if your cuff is the wrong size.
• The numbers on the monitor must be easy for you to read.
• If you are using a stethoscope, you must be able to hear heart sounds through it.
• Cost may be an important factor. Since home blood pressure units vary in price, you may have to shop around. The
most expensive units might not be the best or the most accurate.

How do I know if my monitoring device is accurate or if I am using it correctly?
• Once you buy your monitor, take it to your doctor’s office to be checked for accuracy. You should have your monitor
checked once a year. Proper care and storage are also necessary. Make sure the tubing is not twisted when the moni-
tor is stored, and keep it away from heat. Periodically check the tubing for cracks and leaks.
• Ask your doctor or nurse to teach you how to use your blood pressure monitor correctly. Proper use of it will help
you and your doctor achieve good results in controlling your blood pressure.

Understanding the Medical Terms
• Blood pressure is the force of blood against the walls of the artery.
• Hypertension means high blood pressure.
• Brachial artery is a blood vessel that goes from your shoulder to just below your elbow. You measure the pressure in
this artery.
• Systolic pressure is the highest pressure in an artery when your heart is pumping blood to your body.
• Diastolic pressure is the lowest pressure in an artery when your heart is at rest.
• Blood pressure measurement is made up of both the systolic and the diastolic pressure. It is normally written like
this: 120/80, with the systolic number first.
Monitoring Your Blood Pressure

**What Do I Need To Do Before I Measure My Blood Pressure?**

- Rest for 3 to 5 minutes before measuring your blood pressure. Do not talk.
- Sit in a comfortable position, with your legs and ankles uncrossed and your back supported.
- Place your arm, raised to the level of your heart, on a table or a desk, and sit still.
- Wrap the correctly sized cuff smoothly and snugly around the upper part of your bare arm. The cuff should fit snugly, but there should be enough room for you to slip one fingertip under the cuff.
- Be certain that the bottom edge of the cuff is 1 inch above the crease of your elbow.

**How Do I Use an Aneroid Monitor?**

- Put the stethoscope ear pieces into your ears, with the ear pieces facing forward.
- Place the stethoscope disk on the inner side of the crease of your elbow.
- Rapidly inflate the cuff by squeezing the rubber bulb to 30 to 40 points higher than your last systolic reading. Inflate the cuff rapidly, not just a little at a time. Inflating the cuff too slowly will cause a false reading.
- Slightly loosen the valve and slowly let some air out of the cuff. Deflate the cuff by 2 to 3 millimeters per second. If you loosen the valve too much, you won’t be able to determine your blood pressure.
- As you let the air out of the cuff, you will begin to hear your heartbeat. Listen carefully for the first sound. Check the blood pressure reading by looking at the pointer on the dial. This number will be your systolic pressure.
- Continue to deflate the cuff. Listen to your heartbeat. You will hear your heartbeat stop at some point. Check the reading on the dial. This number is your diastolic pressure.
- Write down your blood pressure, putting the systolic pressure before the diastolic pressure (for example, 120/80).
- If you want to repeat the measurement, wait 2 to 3 minutes before reinflating the cuff.

**How Do I Use a Digital Monitor?**

- Put the cuff around the arm. Turn the power on, and start the machine.
- The cuff will inflate by itself with a push of a button on the automatic models. On the semiautomatic models, the cuff is inflated by squeezing the rubber bulb. After the cuff is inflated, the automatic mechanism will slowly reduce the cuff pressure.
- Look at the display window to see your blood pressure reading. The machine will show your systolic and diastolic blood pressures on the screen. Write down your blood pressure, putting the systolic pressure before the diastolic pressure.
- Press the exhaust button to release all of the air from the cuff.
- If you want to repeat the measurement, wait 2 to 3 minutes before reinflating the cuff.

**Informing Your Doctor of Your Blood Pressure and Pulse**

- Note: If you don’t have an aneroid monitor or a digital monitor, you will need to go to a drug store and purchase one.
- Each day, record your blood pressure readings and email your online doctor the Microsoft Excel spreadsheet every 21 days. Your graphs will be updated and you can view them in the links provided in your health program. Your health program can be accessed at the following link:

- If you do not have Microsoft Excel on your computer or you don’t know how to use the program, you can email your doctor your blood sugar readings. The dates to email your readings are contained in the email you received or you may view the dates by going to MyHealth Program at the link above.
SAMPLE BLOOD PRESSURE GRAPH - ONE MONTH

After four months of treatment this person’s graph has dramatically improved and at the end of the month the blood sugar readings are in the normal range.
This is a four month graph. Keeping this type of graph really does show the improvement over a longer period of time.
**RECORDING YOUR BLOOD PRESSURE READINGS**

You may want to print several copies of this page so you can record your blood pressure readings over several days. Then open the blood pressure Microsoft Excel spreadsheet and type in your blood pressure readings.

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