Vital Signs

What are vital signs?

Vital signs are measurements of the body's basic functions. Normal vital signs change with age, sex, weight, exercise tolerance, and overall health. The four main vital signs that are usually monitored include:

- Body temperature
- Pulse rate (heart rate)
- Rate of breathing (respiration rate)
- Blood pressure

What is body temperature?

The temperature of a person varies depending on recent activity, consumption of food or fluids, and time of day. Normal temperature can range from 97.8 to 99.1 degrees Fahrenheit.

A fever is when the body temperature is higher than normal for an individual. It can indicate an abnormal process going on in the body such as an infection.

There are many devices, called thermometers, that can be used to take a temperature. Often a probe that will record the temperature is placed under the tongue, under the arm, or rectally. There are special thermometers that quickly measure the temperature of the ear drum. There are also thermometers that measure the temperature of the skin on the forehead.

What is a pulse rate?

The pulse rate measures the heart rate, or the number of times the heart beats per minute. As the heart pushes blood through the arteries, the arteries pulsate with each beat. Taking a pulse not only measures the heart rate but it can also be felt if the heart is beating in a steady or an irregular fashion. This is important to note.

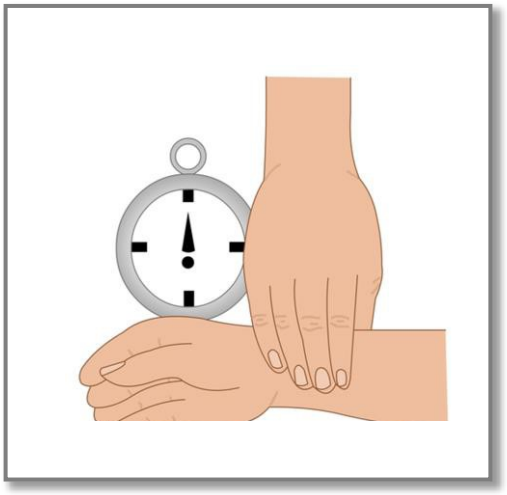
The normal pulse for adults ranges from 60 to 100 beats per minute. The pulse rate can fluctuate and increase with exercise, sickness, injury, and emotions. Females tend to have faster heart rates than males. Athletes often have quite slow heart rates and can tolerate a pulse down to 40 beats per minute.

How to check your pulse:

As the heart beats, you can feel the beats by firmly pressing on the arteries which are located close to the skin's surface. The pulse can most easily be found on the side of the lower neck, on the inside of the elbow, or at the wrist.

To take a pulse:

- Using your first and second fingertips, press on the artery until you feel the pulse
- Count the pulse for 30 seconds and then multiply by 2 to get the pulse which is always recorded as beats per minute. Counting the pulse for 15 seconds and multiplying by 4 is also acceptable.



What is the respiration rate?

The respiration is the number of breaths a person takes per minute. The rate is taken by simply counting the number of breaths over one minute by watching and counting how many times the chest rises.

Respiration rates can increase with a fever or other illness, or with some medical conditions such as lung disease.

Normal rates for an adult at rest range from 12 to 20 breaths per minute.

Blood Pressures

Elevated blood pressure is associated with heart disease, congestive heart failure, sudden death from heart attacks, strokes, and kidney disease. Monitoring blood pressure is important and should be done on a regular basis. For a young, healthy adult blood pressure readings should be taken at least every two years. For anyone with medical problems such as diabetes, or on medications such as antipsychotics; measuring the blood pressure should be done several times each year.

What do blood pressure numbers mean?

120/70

Read as "one twenty over seventy millimeter mercury" (mm Hg)

Systolic

The top number, which is the higher of the two numbers, measures the pressure in the arteries when the heart beats (the heart muscle squeezes or contracts).

Diastolic

The bottom number, which is also the lower of the two numbers, measures the pressure in the arteries between heart beats (when the heart muscle relaxes).

What are normal blood pressures?

Blood Pressure Category	***Systolic*** mm Hg		***Diastolic*** mm Hg
Normal	less than **120**	and	less than **80**
Prehypertension	**120 – 139**	or	**80 – 89**
High Blood Pressure (Hypertension) Stage 1	**140 – 159**	or	**90-99**
High Blood Pressure (Hypertension) Stage 2	**160 or higher**	or	**100 or higher**
Hypertensive Crisis (Emergency Care Needed)	**Higher than 180**	or	**Higher than 120**

Symptoms of high blood pressure:

High blood pressure usually occurs with no symptoms. Many people believe that people with high blood pressure will have headaches, nervousness, sweating, or facial flushing. Those symptoms are actually seldom seen. Studies have actually shown that people with high blood pressure often have fewer headaches than those with normal blood pressure.

Nosebleeds were also thought to be an indicator of high blood pressure. Nosebleeds can be caused by many factors, the most common being dry air. But nosebleeds are not a reliable indicator of high blood pressure though they can occur with extremely high blood pressure readings.

A hypertensive crisis, however, can cause many symptoms and emergency medical treatment is needed. Symptoms that occur with very high blood pressure readings include severe headaches, severe anxiety, and shortness of breath.

Symptoms of low blood pressure:

Low blood pressure (hypotension) is generally defined as a systolic pressure less than 90 mm Hg and a diastolic pressure less than 60 mm Hg. However blood pressure is not considered too low unless the person has symptoms. Many athletes have blood pressures that are quite low and this is a sign of their fitness.

Symptoms of low blood pressure include:

- Dizziness or lightheadedness
- Fainting
- Nausea
- Blurred vision
- Fatigue
- Depression

Low blood pressures can occur with:

- Prolonged bed rest
- Blood loss such as from a bleed in the gastrointestinal tract
- Medications such as those used for high blood pressure, drugs for Parkinson's disease, and pain medications.
- Heart problems
- Thyroid problems
- Severe infection (such as septic shock)
- Allergic reactions (anaphylaxis)
- Anemia

Taking blood pressures:

Blood pressure varies throughout the day and night. Blood pressure is affected by mental and physical activity and stress. Smoking and/or drinking caffeinated beverages also raise the blood pressure.

Accurate measurement of blood pressures requires paying attention to the size and placement of the cuff, the position of the person, and the technique used.

- Cuff size: if the cuff is too small, the systolic pressure will read incorrectly high.
- Cuff placement: ideally above the elbow over a bare arm. It can be taken over thin clothing but not thick clothing. The sleeve should not be rolled up as this causes pressure around the arm and an incorrect reading.

- Body position: crossing of the legs, or sitting without a back support can cause the pressure to be higher.
- Body position: the arm should be supported at the level of the heart, not allowed to hang down as that can cause an incorrectly high reading.
- With automatic blood pressure devices, the cuff is inflated automatically to the correct amount. With manual blood pressure cuffs, the cuff should be inflated to about 180 mm Hg and then allowed to deflate slowly. When the pulse is first heard, that is the systolic pressure reading. As the air escapes the cuff, the sound of the pulse will disappear. That is the diastolic pressure reading.
- Wrist blood pressures are often taken especially in obese people. With wrist blood pressure readings, there is often a false elevation of blood pressures.
- Blood pressure measurements in the finger are not recommended as these readings can be quite inaccurate.

Pulse oximetry:

Often called the "fifth" vital sign, pulse oximetry is a non-invasive way to monitor oxygen saturations. Prior to the use of pulse oximeters, the amount of oxygen in the blood could only be measured by drawing blood directly from an artery and analyzing that.

Pulse oximetry is generally done by using a device placed on the end of a finger or on the earlobe. Light of two wavelengths passes through the tissue and the oxygen saturation is measured. The measurement is the percent saturation of oxygen which is being carried by hemoglobin in the blood. Hemoglobin is the oxygen carrying pigment in our red blood cells.

A normal reading is 95% to 99%. Readings below 90% often indicate that someone needs to have supplemental oxygen.

Applications for use:

Pulse oximetry is used extensively in medical offices and hospitals. It is also now widely used in the home setting to monitor people with heart and lung problems. Uses include

- Monitoring the level of supplemental oxygen needed for someone with COPD, CHF, or other diseases.
- Monitoring someone who is ill with a respiratory infection.
    - A fall in oxygen can be a warning that the person needs further evaluation immediately.
- Monitoring oxygen levels during sleep can help diagnose sleep apnea.

False Readings

There are some limitations of this technology and can result in either falsely low or high oxygen saturation readings:

- Low blood pressure as blood does not circulate well into the hands.
- Hypothermia (very low body temperature) as blood vessels will constrict or narrow.
- Motion such as shivering or seizures can affect readings.
- Congenital medical conditions of abnormal hemoglobin or severe anemia can affect readings.
- Poor sugar control in diabetics has been associated with high oxygen saturation readings due to an increase in oxygen "sticking" to hemoglobin in the blood.
- Nail polish or artificial nails could affect the reading but the probe can be placed sideways on the finger so that the pulsed light does not go through the nails. Dark skin pigmentation can also affect readings.
- Intense daylight, fluorescent light and other intense light can cause falsely low readings.