2 Hours

SESSION VII

EXAMINATION OF VITAL SIGNS

SESSION VII EXAMINATION OF VITAL SIGNS

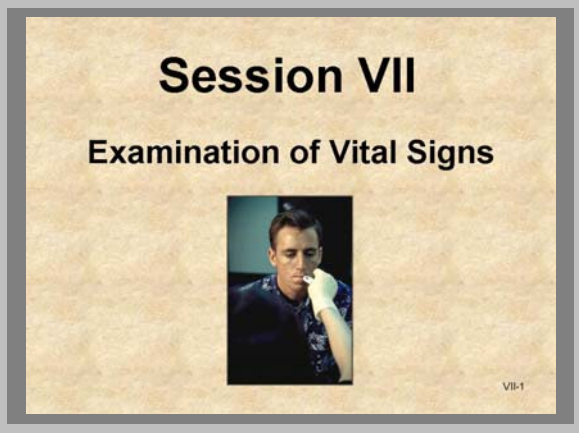
Upon successfully completing this session the student will be able to:

- Explain the purposes of the various vital signs examinations in the drug influence evaluation procedure.
- Explain the administrative procedures for these examinations.
- Explain the cues obtained from these examinations.
- Document the examinations of vital signs accurately and completely.
- Correctly answer the "topics for study" at the end of this session.

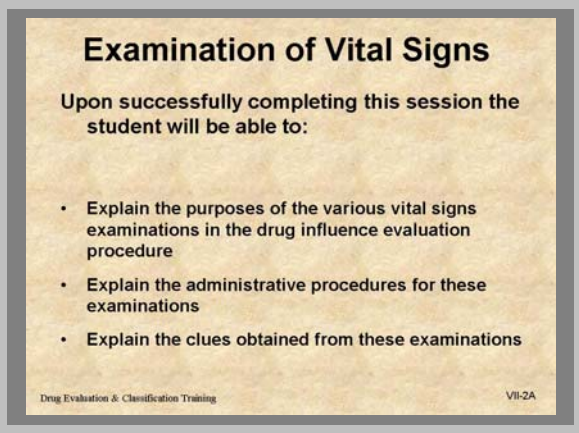
CONTENT SEGMENTS	LEARNING ACTIVITIES
A. Purpose of the Examinations	▪ Instructor-Led Presentations
B. Procedures and Cues	▪ Instructor-Led Demonstrations
C. Demonstrations	▪ Audio Tape Presentation
D. Documentation Procedures	▪ Student-Led Demonstrations
E. Practice	▪ Students' Hands On Practice
	▪ Reading Assignments

I. EXAMINATION OF VITAL SIGNS

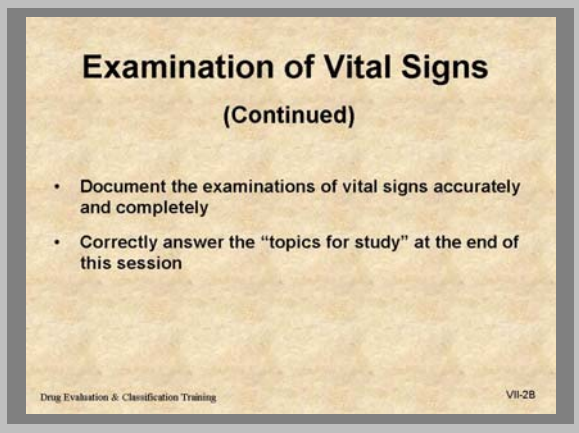
Session 7-1: Examination of Vital Signs



Session 7-2A: Examination of Vital Signs



Session 7-2B: Examination of Vital Signs (cont.)



Briefly review the content, objectives and activities of this session.

A. Purposes of the Examinations

The vital signs that are relevant to the drug influence evaluation include:

Point out these vital signs on the wall chart.

- Pulse Rate
- Blood Pressure
- Temperature

Different types of drugs affect these vital signs in different ways.

- Certain drugs tend to "speed up" the body and elevate these vital signs.

Clarification:

- Pulse may quicken
- Blood pressure may rise
- Temperature may rise

Other drugs tend to "slow down" the body and lower these vital signs.

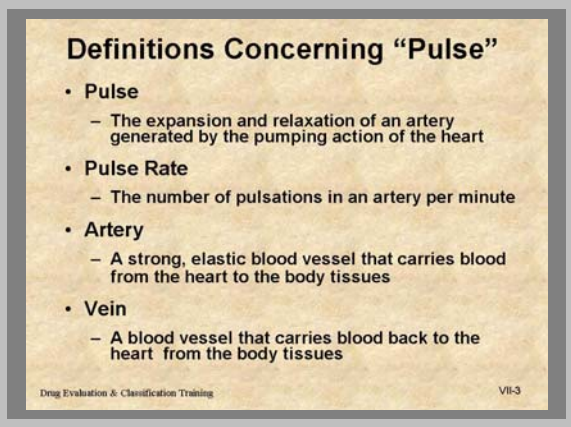
Clarification:

- Pulse may slow
- Blood pressure may drop

Systematic examination of the vital signs gives us much useful information concerning the possible presence or absence of various categories of drugs.

B. Procedures and Cues

Session 7-3: Definitions Concerning "Pulse"



Measurement of Pulse Rate

Pulse is the expansion and relaxation of an artery generated by the pumping action of the heart.

Pulse Rate is the number of pulsations in an artery per minute.

- Point out that pulse rate is equal to the number of contractions of the heart per minute.

An artery is a strong, elastic blood vessel that carries blood from the heart to the body tissues.

Instructor, for your information: technically speaking, pulse rate is not quite the same thing as heart beat rate. There are rare and very serious conditions that could cause the heart to beat so weakly that it is unable to force blood through some or all arteries. In that case, there might be no discernable pulse even though the heart is beating. But with a normal, healthy heart, pulse rate will equal heart beat rate.

A vein is a blood vessel that carries blood back to the heart from the body tissues.

When the heart contracts, it squeezes blood out of its chambers into the arteries.

The surging blood causes the arteries to expand.

By placing your fingers on the skin next to an artery and pressing down, you can feel the artery expand as the blood surges through.

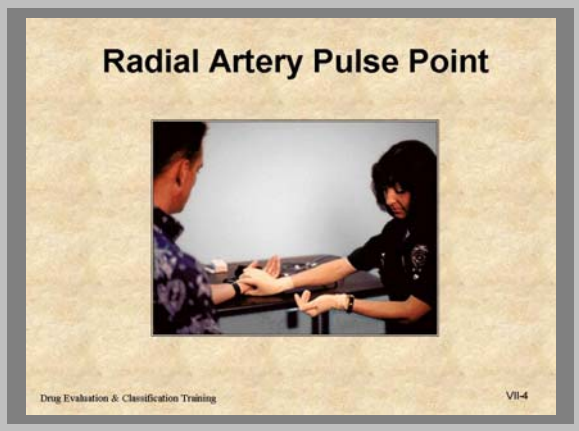
- Emphasize: the "surge" can be felt as the blood is squeezed from the heart through an artery. The pulse cannot be felt in a vein.

By keeping your fingers on the artery and counting the number of pulses that occur in one minute, you will measure the pulse rate.

Demonstrate this, by holding your fingers on your own radial artery.

Pulse is easy to measure, once you locate an artery close to the surface of the skin.

Session 7-4: Radial Artery Pulse Point



Radial Artery

One convenient pulse point involves the radial artery.

- The radial artery can be located in or near the natural crease of the wrist, on the side of the wrist next to the thumb.
- Point to the radial artery pulse point on your own wrist.
- Hold your left hand out, with the palm up.

Demonstrate this.

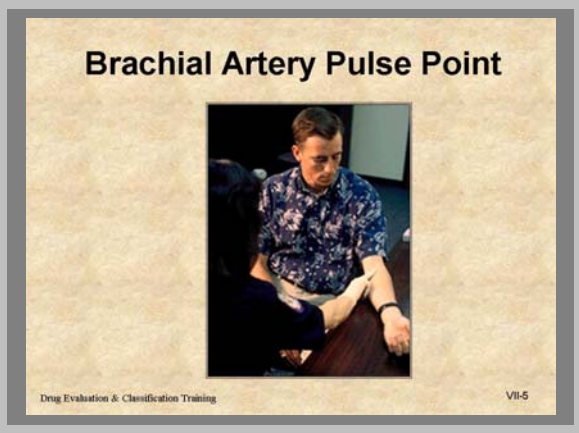
- Place the tips of your right hand's index finger and middle finger into the crease of your wrist, and exert a slight pressure.

Demonstrate this.

- You should be able to feel the pulse in your radial artery.

Ask students whether they can feel their pulses. Coach any students who have difficulty in locating the pulse.

Session 7-5: Brachial Artery Pulse Point



Brachial Artery

Another pulse point involves the brachial artery.

- The brachial artery can be located in the crook of the arm, halfway between the center of the arm and the side of the arm closest to the body.

- Point to the brachial artery pulse point in your own arm.

- Instruct students to roll up their sleeves, if necessary, to expose their brachial artery pulse points.

- Hold your left hand out, with the palm up.

Demonstrate this.

- Place the tips of your right hand's index and middle fingers into the crook of your left arm, close to the body, and exert a slight pressure.

Demonstrate this.

- You should be able to feel the pulse in your brachial artery.

Ask students whether they can feel their pulses. Coach any students who have difficulty locating the pulse.

Carotid Artery

Another pulse point involves the carotid artery.

- The carotid artery can be located in the neck, on either side of the Adam's apple.

- Point out the carotid artery pulse point on your own neck.

- Place the tips of your right hand's index and middle fingers alongside the right side of your Adam's apple.

Demonstrate this.

- You should be able to feel the pulse in your carotid artery.

Ask students whether they can feel their pulses. Coach any students who have difficulty locating the pulse.

Basic Do's and Don'ts of Measuring Pulse

Note, however, that there is wide variation in "normal" human pulse rate.

- Don't use your thumb to apply pressure while measuring a subject's pulse.

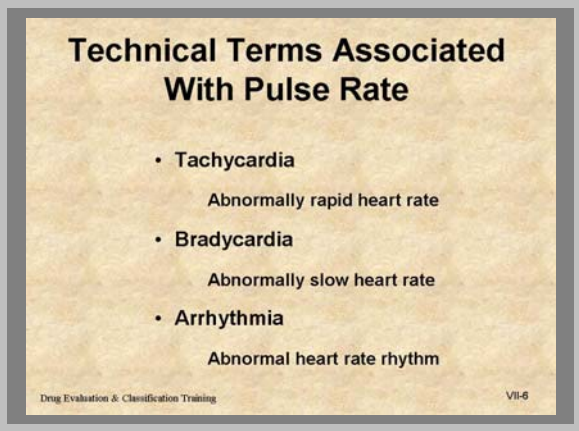
- Point out that there is an artery located in the thumb close to the surface of the skin. If you apply pressure with the thumb, you may wind up measuring your own pulse when you think you are measuring the subject's.

- If you use the carotid artery pulse point, don't apply pressure to both sides of the Adam's apple: this can cut off the supply of blood to the brain.

- When measuring the pulse rate, use time intervals of 30 seconds.

- Point out that pulse rate is always expressed as "beats per minute." When you count the beats during an interval of 30 seconds, you must double the result to obtain the pulse rate.

Session 7-6: Technical Terms Associated With Pulse Rate



Some Technical Terms Associated with Pulse Rate

- Tachycardia: abnormally rapid heart rate.

- Bradycardia: unusually slow heart rate.

- Arrhythmia: abnormal heart rhythm.

Students' Initial Practice at Measuring Pulse Rate

- Instruct students to work in pairs, taking turns measuring each other's pulse.

- Tell students to record on paper their partner's pulse rate.

- Monitor, coach and critique the students' practice.

- Allow the practice to continue for only about 5 minutes.

PRINT the following lists on the dry erase board or flip-chart.

50 or less____	76 – 78____
52 – 54____	80 – 82____
56 – 58____	84 – 86____
60 – 62 ____	88 – 90____
64 – 66____	92 – 94____
68 – 70____	96 – 98____
72 – 74____	100 or more___

- Point out that the "normal range" of pulse rate is 60 – 90 beats per minute.

TABULATE the numbers of students whose pulse rates were in each of the listed intervals.

Measurement of Blood Pressure

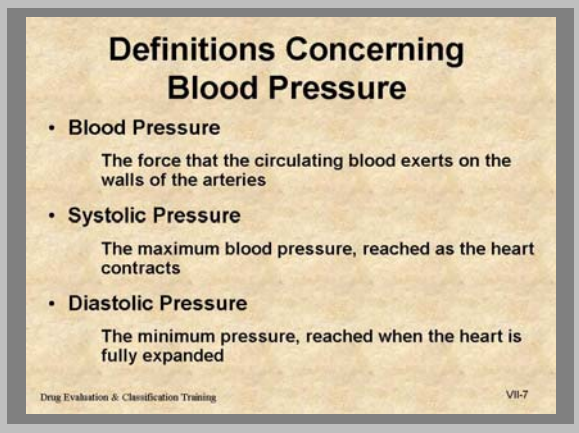
Blood Pressure is the force that the circulating blood exerts on the walls of the arteries.

- Blood pressure is measured in millimeters of mercury.
- Example: a blood pressure of 120 means that the blood is pressing on the walls of the artery with enough force to push liquid mercury 120 millimeters up a glass tube.
- Point out that 120 millimeters is approximately four and three-quarter inches.
- We commonly abbreviate "millimeters of mercury" as mmHg.

Print "mmHg" on the dry erase board or flip-chart.

Instructor, for your information: "Hg" is the chemical symbol for the element mercury. It comes from Hydrargyrum, the Latin word for mercury.

Session 7-7: Definitions Concerning Blood Pressure



- Blood Pressure changes constantly as the heart contacts and relaxes.
- Blood Pressure reaches its maximum as the heart contracts and sends the blood surging through the arteries. This is called the systolic pressure.
- Blood Pressure reaches its minimum when the heart is fully expanded. This is called the diastolic pressure.
- It is always necessary to measure and record both the systolic and diastolic blood pressure.
- Remind students that "systolic" is the higher number, "diastolic" the lower number.

Memory aid:

Systolic: "S" for "Superior"
Diastolic: "D" for "Down"

Sphygmomanometer

The device used for measuring blood pressure is called a sphygmomanometer.

The sphygmomanometer has a special cuff that can be wrapped around the subject's arm and inflated with air pressure.

Exhibit a sphygmomanometer.

Write "SPHYGMOMANOMETER" on the dry erase board or flip-chart.

Select a student to come before the class. Have the student sit in a chair facing the class, and roll up a sleeve (if necessary) to expose a bicep.

- Advise students to check for birth control implants in the upper left arm. If the subject has an implant, blood pressure should be taken on the right arm and documented.
- Instruct the student to elevate the arm and squeeze the fist several times; explain that this helps to drain blood from the arm.
- As the pressure in the cuff increases, the cuff squeezes tightly on the arm.
- Wrap the cuff around the student volunteer's arm and inflate it.
- When the pressure gets high enough, it will squeeze the artery completely shut.

Ask the student volunteer whether they can feel the pressure of the cuff.

- Blood will cease flowing through the brachial artery. And, since the brachial artery "feeds" the radial artery, blood will also cease flowing through the radial artery.

Ask students: "What artery is located in the crease of the elbow?" (Point to that location on the student volunteer's arm).

- If we slowly release the air in the cuff, the pressure on the arm and on the artery will start to drop.
- Release the pressure in the cuff on the student volunteer's arm.
- Eventually, the pressure will drop enough so that blood will once again start to flow through the artery.

Ask students: "How far must the pressure in the cuff drop before the blood can start to squeeze through the artery?"

- Blood will start flowing in the artery once the pressure inside the artery equals the pressure outside the artery.

- The two pressures will become equal when the air pressure in the cuff drops down to the systolic pressure.

- When that happens, blood will spurt through the artery each time the heart contracts.

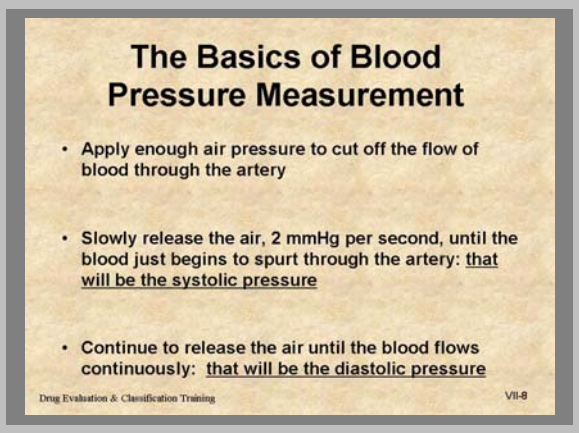
Ask students: "What would happen if we allowed the pressure in the cuff to drop down to the systolic level, and held the air pressure at that level?"

- Point out that the blood would spurt through the artery each time the heart contracted, but would cease flowing when the heart expanded.

- Once the air pressure in the cuff drops down to the diastolic level, the blood will flow continuously through the artery.

Ask students: "How far down must the air pressure in the cuff drop before the blood will flow through the artery continuously?"

Session 7-8: The Basics of Blood Pressure Measurement



Overview of Procedures for Measuring Blood Pressure

- Apply enough air pressure to the cuff to cut off the flow of blood through the artery.

Demonstrate, using the student volunteer (apply pressure to the cuff).

- Slowly release the air pressure until the blood just begins to spurt through the artery: that level will be the systolic pressure.

- Slowly release the pressure in the cuff.

- Continue to release the air pressure until the blood flows continuously through the artery: that level will be the diastolic pressure.

Ask students:

- "How can we tell when the blood starts to spurt through the artery?"
- "How can we tell when the blood is flowing continuously through the artery?"
- We can listen to the spurting blood, using a stethoscope.

Exhibit a stethoscope.

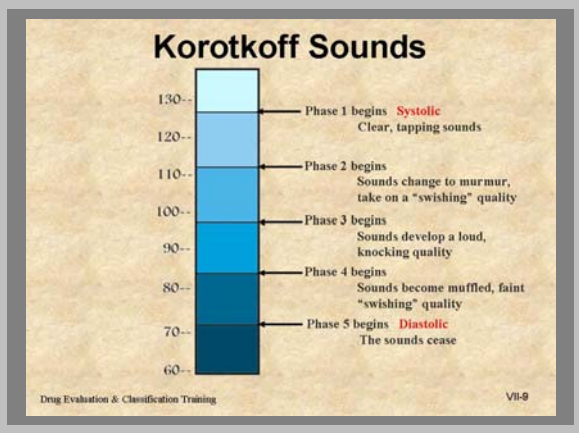
- Apply the stethoscope to the skin directly above the artery.

Demonstrate, using the student volunteer.

- Apply pressure to the cuff, enough to cut off the flow of blood.
- When no blood is flowing through the artery, we hear nothing through the stethoscope.
- Inflate the cuff on the student volunteer's arm.
- Slowly release the air from the cuff, letting the pressure start to drop.
- Release the air in the cuff.
- When we drop to the systolic pressure, we start to hear a spurting sound.
    - Note: this begins as a clear, tapping sound.
- As we continue to allow the air pressure to drop, the surges of blood become steadily longer.
    - Note: the sounds take on a swishing quality, and become fainter.
- When we drop to the diastolic pressure, the blood flows steadily and all sounds cease.

Excuse the student volunteer and thank them for participating.

Session 7-9: Korotkoff Sounds



Korotkoff Sounds

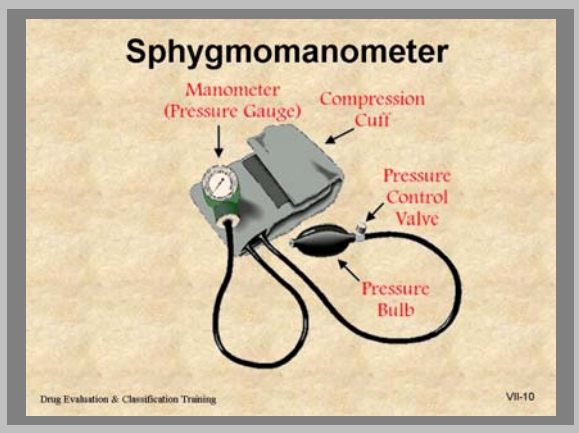
The sounds that we listen to are called Korotkoff Sounds. They are divided into 5 phases:

Note: Slide VII-9A contains a sound clip of the Korotkoff sounds.

- Phase 1 – the first appearance of clear, tapping sounds that gradually increase in intensity.
    - Point out that the beginning of Phase 1 corresponds to the systolic pressure.
- Phase 2 – the sounds change to a murmur and take on a swishing quality.
- Phase 3 – the sounds develop a loud, knocking quality (not quite as clear as the Phase 1 sounds).
- Phase 4 – the sounds become muffled and again have a faint swishing quality.
- Phase 5 – the sounds cease.
    - Point out that the beginning of Phase 5 corresponds to the diastolic pressure.

Session 7-9A: Korotkoff Sounds

Session 7-10: Sphygmomanometer



Familiarization with the Sphygmomanometer

- Hand out stethoscopes and sphygmomanometers (one per each student is desirable. At minimum, there should be one for every four students).

The compression cuff contains an inflatable rubber bladder.

- Point out the components of the sphygmomanometer on the visual.

- Point out that blood pressure cuffs come in three sizes: child, adult, and extra large, depending on the size of the bladder.

A tube connects the bladder to the manometer, or pressure gauge.

- Clarification: the manometer displays the air pressure inside the bladder. In the DEC program, we use an aneroid (without fluid) pressure gauge.

Another tube connects the bladder to the pressure bulb, which can be squeezed to inflate the bladder.

The pressure control valve permits inflation of the bladder and regulates the rate at which the bladder is deflated.

To inflate the bladder, the pressure control valve must be twisted all the way to the right.

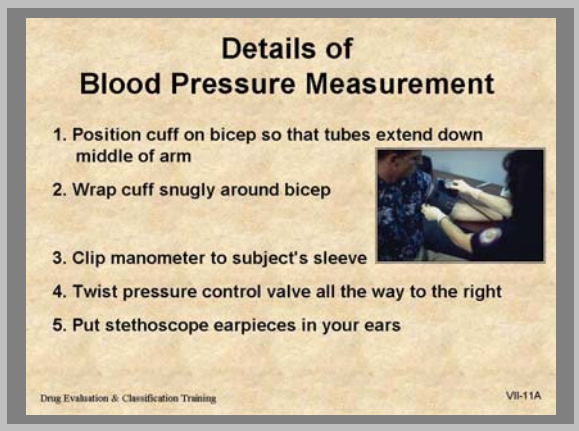
Demonstrate this.

When the valve is twisted all the way to the right, air can be pumped into the bladder, but no air can escape from the bladder.

To deflate the bladder, twist the valve to the left.

The more the valve is twisted to the left, the faster the bladder will deflate.

Session 7-11A: Details of Blood Pressure Measurement



Details of Blood Pressure Measurement

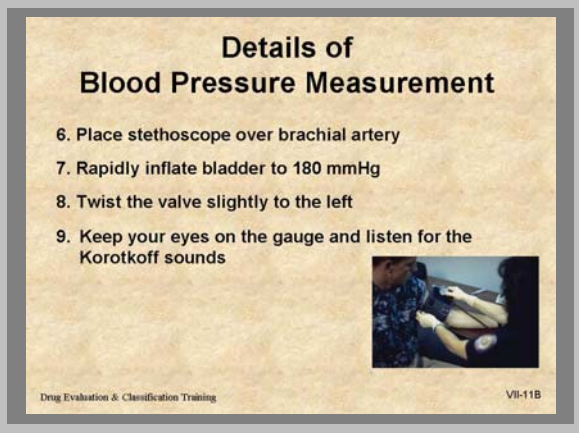
Select a student to serve as a blood pressure subject. Demonstrate the procedures using the student.

- If it proves difficult to hear the Korotkoff sounds, simply have the subject elevate the arm and squeeze the fist several times, to drain the arm: the Korotkoff sounds louder.

- The manometer (pressure gauge) may be clipped on the subject's sleeve, so that it is readily viewable.

- Twist the pressure control valve all the way to the right.

Session 7-11B: Details of Blood Pressure Measurement (cont.)



- Put the stethoscope earpieces in your ears.

- Make sure the earpieces are turned forward, i.e. toward the nose.

- Place the diaphragm or bell of the stethoscope over the brachial artery.

- Rapidly inflate the bladder to a pressure of at least 180.

  - Point out that, if the subject's blood pressure is very elevated, it may be necessary to inflate the bladder to a higher pressure.

- Twist the pressure control valve slightly to the left to release the pressure slowly.

  - Emphasize the need to release the pressure slowly. If the pressure drops too fast, the needle will sweep down the gauge too quickly to be read accurately.

- The pressure should be released at a speed that takes one full second for the needle to move a single gradation (i.e. 2 millimeters of mercury) on the gauge.

- Keep your eyes on the gauge and listen for the Korotkoff sounds.
    - Point out that the needle on the pressure gauge generally will "bounce" slightly when blood starts to spurt through the artery.

Excuse the student and thank him or her for participating. Solicit students' questions concerning these procedures.

Point out that "normal" values of blood pressure are:

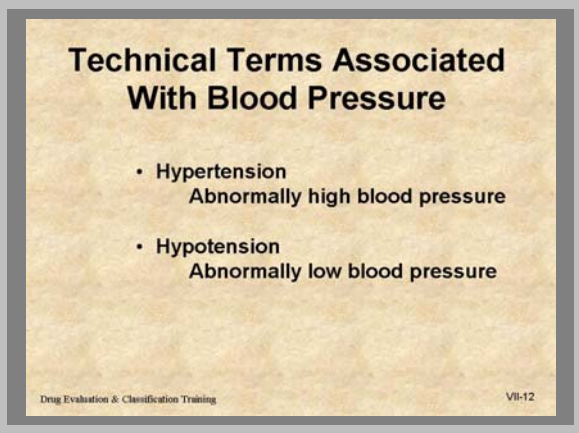
Systolic: 120 – 140
Diastolic: 70 – 90

- Note, however, that "normal" people can have significantly different blood pressures: there is wide variation in human blood pressure.

Do's and Don'ts of Blood Pressure Measurement

- If you inflate the bladder and then need to repeat the measurement, wait at least three minutes to allow the subject's artery's to return to normal.

Session 7-12: Technical Terms associated With Blood Pressure



Some Technical Terms Associated with Blood Pressure

- Hypertension: abnormally high blood pressure.
- Hypotension: abnormally low blood pressure.

Students Initial Practice at Measuring Blood Pressure

If at least one sphygmomanometer and stethoscope are available for every two students, instruct students to practice in pairs. Otherwise, assign students to practice in teams of 3 or 4 members. Monitor, coach and critique the students' practice.

Allow this practice to continue for only about 10 minutes.

- Remind students that when they measure and record blood pressure it is not necessary to use the symbols "mmHg." Simply record the numbers.

Measurement of Temperature

- Body temperature is measured using an oral thermometer.
- Note: a digital thermometer with plastic sleeves is recommended.

Exhibit this.

- Point out that when measuring temperature to ensure that the thermometer remains under the subject's tongue. DRE's should also try to refrain from letting the subject's drink hot or cold fluids immediately prior to measuring temperature.
- Make sure that a fresh disposable mouthpiece is used each time.

Solicit students' comments and questions concerning this overview of procedures and cues.

C. Demonstrations

Pulse Rate Measurement

Select two students to come before the class.

Radial artery pulse point:

- Instruct the first student to measure the second student's pulse using the radial artery pulse point. (Simultaneously, the instructor should measure the subject's pulse using a carotid artery pulse point).

Carotid artery pulse point:

- Instruct the second student to measure the first student's pulse using the carotid artery pulse point. (Simultaneously, the instructor should measure the subject's pulse using a radial artery pulse point).

Excuse the two students and thank them for participating.

Blood Pressure Measurement

Select two other students to come before the class.

- Instruct the first student to measure the second student's blood pressure.

- Have the students reverse roles.

Excuse the two students and thank them for participating.

D. Documentation Procedures

Review the sections of the Standardized Form used to record vital signs measurements.

E. Practice

- Instruct students to practice in teams of 2 – 4 members, taking in turns measuring each other's vital signs.

- Monitor, coach and critique the students' practice.

Session 7-13: Questions

TOPICS FOR STUDY

1. Where is the Radial Artery pulse point?

   Crease of the wrist

2. Why should you never attempt to feel a subject's pulse with your thumb?

   You can mistakenly measure your own pulse

3. Does an artery carry blood to the heart or from the heart?

   Away from the heart

4. What does the symbol "Hg" represent?

   Mercury (Hydrargyrum)

5. What is Diastolic pressure?

   The pressure when the heart relaxes

6. When do the Korotkoff Sounds begin?

   At the systolic level when the blood begins to spurt through the brachial artery.

7. Name and describe the major components of a Sphygmomanometer.

   Compression cuff, Pressure bulb, Manometer, Pressure control valve, Tubes

8. Which of the seven categories of drugs generally will cause blood pressure to be elevated?

   CNS Stimulants, Hallucinogens, Dissociative Anesthetics, Inhalants, Cannabis