Upon successfully completing this session the participant 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 clues 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
A. Purpose of the Examinations
B. Procedures and Clues
C. Demonstrations
D. Documentation Procedures
E. Practice

LEARNING ACTIVITIES
Instructor-Led Presentations
Instructor-Led Demonstrations
Audio Tape Presentation
Participant-Led Demonstrations
Participants’ Hands On Practice
Reading Assignments
A. **Purpose of the Examinations**

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

- 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.
Definitions Concerning “Pulse”

- **Pulse**: The expansion and contraction of an artery generated by the pumping action of the heart.
- **Pulse Rate**: The number of pulsations in an artery per minute.
- **Artery**: A strong, elastic blood vessel that carries blood from the heart to the body tissues.
- **Vein**: A blood vessel that carries blood back to the heart from the body tissues.

**B. Procedures and Clues**

**Measurement of Pulse Rate**

Pulse is the expansion and contraction of an artery generated by the pumping action of the heart. Pulse Rate is the number of pulsations in an artery per minute.

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

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

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

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

You should be able to feel the pulse in your radial 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 participants to roll up their sleeves, if necessary, to expose their brachial artery pulse points.
- Hold your left hand out, with the palm up.
- 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.

You should be able to feel the pulse in your brachial artery.
Carotid Artery Pulse Point

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.

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

Basic Do’s and Don’ts of Measuring Pulse

- Don’t use your thumb to apply pressure while measuring a subject’s pulse
- When measuring the pulse rate, use time intervals of 30 seconds

Basic Do’s and Don’ts of Measuring Pulse

- 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
Technical Terms Associated with Pulse Rate

- Tachycardia: abnormally rapid heart rate
- Bradycardia: unusually slow heart rate
- Arrhythmia: abnormal heart rate rhythm

Some Technical Terms Associated with Pulse Rate

- Tachycardia: abnormally rapid heart rate
- Bradycardia: unusually slow heart rate
- Arrhythmia: abnormal heart rhythm

<table>
<thead>
<tr>
<th>Heart Rate Range</th>
<th>Normal Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 or less</td>
<td>76 – 78</td>
</tr>
<tr>
<td>52 – 54</td>
<td>80 – 82</td>
</tr>
<tr>
<td>56 – 58</td>
<td>84 – 86</td>
</tr>
<tr>
<td>60 – 62</td>
<td>88 – 90</td>
</tr>
<tr>
<td>64 – 66</td>
<td>92 – 94</td>
</tr>
<tr>
<td>68 – 70</td>
<td>96 – 98</td>
</tr>
<tr>
<td>72 – 74</td>
<td>100 or more</td>
</tr>
</tbody>
</table>
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.

**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.
- Blood Pressure changes constantly as the heart contracts 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.
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.

As the pressure in the cuff increases, the cuff squeezes tightly on the arm. Wrap the cuff around the participant volunteer’s arm and inflate it.

When the pressure gets high enough, it will squeeze the artery completely shut. 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.
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 participant volunteer’s arm.

Eventually, the pressure will drop enough so that blood will once again start to flow 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.

Once the air pressure in the cuff drops down to the diastolic level, the blood will flow continuously through the artery.
The Basics of Blood Pressure Measurement

• Apply enough air pressure to cut off the flow of blood through the artery.
• Slowly release the air, 2 mmHg per second, until the blood just begins to spurt through the artery: **that will be the systolic pressure**.
• Continue to release the air until the blood flows continuously: **that will be the diastolic pressure**.

Overview of Procedures for Measuring Blood Pressure

• Apply enough air pressure to the cuff to cut off the flow of blood through the artery.
• 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.
• Apply the stethoscope to the skin directly above the artery.
• 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 participant 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.

Notes:_______________________________________________
_____________________________________________________
_____________________________________________________
_____________________________________________________
_____________________________________________________
_____________________________________________________
_____________________________________________________
_____________________________________________________
_____________________________________________________
_____________________________________________________
_____________________________________________________
The Basics of Blood Pressure Measurement (Cont.)

- Apply enough air pressure to cut off the flow of blood through the artery
- Slowly release the air, 2 mmHg per second, until the blood just begins to spurt through the artery: that will be the systolic pressure
- Continue to release the air until the blood flows continuously: that will be the diastolic pressure

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.

Korotkoff Sounds

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

- Phase 1 – the first appearance of clear, tapping sounds that gradually increase in intensity.
- 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.
**Familiarization with the Sphygmomanometer**

- The compression cuff contains an inflatable rubber 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.
- 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.
Details of Blood Pressure Measurement

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.
Details of Blood Pressure Measurement (Cont.)

- Place stethoscope over brachial artery
- Rapidly inflate bladder to 180 mmHg
- Twist the valve slightly to the left
- Keep your eyes on the gauge and listen for the Korotkoff sounds

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

Note, however, that 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.

• Do wait 3 minutes to repeat the measurement if a second measurement is needed.
• Don’t re-inflate cuff once you start releasing the pressure.

Technical Terms Associated With Blood Pressure

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

Some Technical Terms Associated with Blood Pressure

• Hypertension: abnormally high blood pressure.
• Hypotension: abnormally low blood pressure.
Measurement of Temperature

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

Demonstrations

- Pulse Rate
- Blood Pressure
- Review Standardized Form used to Record Vital Sign Measurements

C. Demonstrations

Pulse Rate Measurement

- Radial artery pulse point:
- Carotid artery pulse point:

Blood Pressure Measurement

Instruct the first participant to measure the second participant’s blood pressure. Have the participants reverse roles.

D. Documentation Procedures
E. Practice

In teams of 2 – 4 members, take turns measuring each other’s vital signs.

QUESTIONS?

Notes:

___________________________________________
___________________________________________
___________________________________________
___________________________________________
___________________________________________
___________________________________________
___________________________________________
___________________________________________

___________________________________________
___________________________________________
___________________________________________
___________________________________________
___________________________________________
___________________________________________
___________________________________________
___________________________________________
TOPICS FOR STUDY
1. Where is the Radial Artery pulse point?

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

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

4. What does the symbol "Hg" represent?

5. What is Diastolic pressure?

6. When do the Korotkoff Sounds begin?

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

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