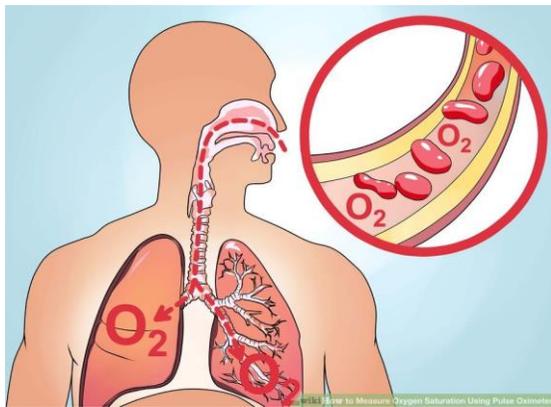


Pulse oximetry

Pulse oximetry: Pulse oximetry is a simple, cheap, and non-invasive procedure used to measure the level of oxygen (or oxygen saturation) in the blood.

Oxygen saturation should always be above 95 percent. However, oxygen saturation may be lower if you have a respiratory disease or congenital heart disease. You can measure the blood's percentage of oxygen saturation using a pulse oximeter, which is a clip-like sensor device that is placed on a thin part of your body, such as an earlobe, nose or finger.



Oxygen is breathed into the lungs. The oxygen then passes into the blood, where the majority of the oxygen attaches to hemoglobin.

Hemoglobin is a protein inside our red blood cells that carries the oxygen through the bloodstream from lungs to all parts of our body. In this way, our body is provided with the oxygen and nutrients it needs to function.

Understanding the reasons for the procedure

Pulse oximetry is used to assess oxygen saturation in the blood for a variety of reasons:

- in surgeries;
- to assess if an adjustment of supplemental oxygen is needed or if lung medications are working effectively;



- to determine patient's tolerance to increased activity;
- to support breathing if the patient uses a ventilator;
- If the patient suffers from sleep apnea or has a serious medical condition, such as heart attack, congestive heart failure, chronic obstructive pulmonary disease (COPD), anemia, lung cancer, asthma, or pneumonia.

Understanding how the pulse oximeter works

- Oximeters use the light absorptive characteristics of hemoglobin and the pulsating nature of blood flow in the arteries to measure the level of oxygen in the body.
- The device has a light source, light detector, and microprocessor, which compares and calculates the differences in oxygen-rich versus oxygen-poor hemoglobin.
- One side of the device contains a light source with two different types of light: infrared and red. These two types of light are transmitted through the body's tissues to the light detector on the other side of the device. Hemoglobin that is more saturated with oxygen absorbs more of the infrared light, while hemoglobin that is oxygen poor absorbs more of the red light.
- The microprocessor calculates the differences and converts the information into a digital value. This value is then assessed to determine the amount of oxygen carried in the blood.



The main steps of pulse oximetry are the following:



- Explain the purpose of the procedure to the patient, ask about his or her agreement:
- *- Now, I would like to determine your hemoglobin saturation with oxygen. This is an important vital sign, depending on it I will prescribe you investigations and treatment, do you agree?*

► After that, you should explain what you want to do:

- Please, relax, don't worry; this procedure is safe and not complicated; I will place the pulse oximeter on the finger, don't move or speak during the procedure, it will take about a few seconds. Please, put your hand on the table (or on the chest).

Using a Pulse Oximeter:

- **Wash your hands** - Handwashing prevents the spread of infection.
- **Remove anything on the site of device that absorbs light.** For example, if you plan to apply the oximeter to your finger, it's important that you remove anything that absorbs light (such as dried blood or nail polish) to avoid false low readings.



- Make sure the finger is room-temperature or slightly warm before beginning the procedure.

- High levels of ambient light, such as overhead lights, phototherapy lights and infrared warmers, can blind the light sensor and give you an inaccurate reading.



Attaching the device:

- The device is usually placed on the finger. Turn the oximeter on.
- The hand should be placed on the chest at the level of the heart or on the table rather than held in the air (as patients commonly do). This helps to minimize any motion.
- Minimize movement. The most common cause of inaccurate oximeter readings is excessive movement.



Reading the measurement:

- The patient's oxygen saturation level and pulse rate are displayed in seconds on a lighted display screen. A range of 95% to 100% is generally considered normal. If your oxygen level drops below 85%, you should seek medical attention.

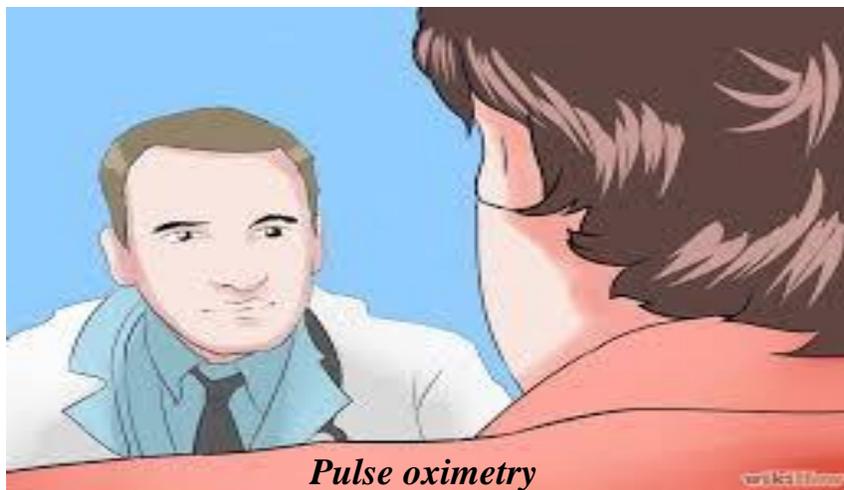


Explain the result to the patient:

- Your level of hemoglobin saturation with oxygen is 85%. You need to have oxygen therapy.

or

- Your level of hemoglobin saturation with oxygen is 96%. It is an excellent value of oxygen saturation.



1. What is pulse oximetry?

-It is a simple, inexpensive and non-invasive procedure used to measure the level of oxygen (or oxygen saturation) in the blood.

2. Oxygen saturation must always be higher than what value?

-The oxygen saturation must always be greater than 95%.

3. In which cases can oxygen saturation be less than 95%?

- In the same case, oxygen saturation may be lower if the patient has respiratory disease or congenital heart disease.

4. With which device can oxygen saturation of blood be measured?

- Oxygen saturation in the blood can be measured using the pulse oximeter, a sensory device that is placed on the thin part of the body, such as the ear, nose or finger.

5. Describe the route of oxygen from the entrance to the body to the cells of the body:

- Oxygen enters the body through the lungs. From the lungs it penetrates into the blood, where it binds with hemoglobin.

-Hemoglobin is a protein located in red blood cells that transports oxygen through the bloodstream to all parts and tissues of the body. Thus the body receives the necessary oxygen and nutrients.

6. What are the reasons for using pulse oximetry to determine oxygen saturation in the blood?

-In surgery to assess the patient's condition.

- to assess if an adjustment of supplemental oxygen is needed or if lung medications are working effectively;
- to determine patient's tolerance to increased activity;
- to support breathing if the patient uses a ventilator;
- If the patient suffers from sleep apnea or has a serious medical condition, such as heart attack, congestive heart failure, chronic obstructive pulmonary disease (COPD), anemia, lung cancer, asthma, or pneumonia.

7. How does the pulse oximeter work?

- The oximeter uses the characteristic of light-absorbing hemoglobin and the pulsating nature of blood flow in the arteries to measure the level of oxygen in the body.
- The device has a light source, light detector, and microprocessor, which compares and calculates the difference in oxygen-rich and oxygen-poor hemoglobin.
- Part of the device has a light source with two types of light: red and infrared. These two types of light are transmitted through the body's tissues to the light detector on the other side of the device. Hemoglobin more saturated with oxygen absorbs more than infrared light, and at the same time hemoglobin without oxygen absorbs more red light.
- Microprocessor calculates the differences and converts the information into a digital value. This value is then evaluated to determine the amount of oxygen carried in the blood.

8. How do you explain the purpose of the patient's pulse oximetry procedure?

- Now I will measure your hemoglobin saturation with oxygen. This is an important parameter of health, depending on the level of saturation I will prescribe the necessary investigations and treatment. Do you agree?

9. How do you explain what you want to do when you are going to check your blood saturation with oxygen?

- Please relax, don't worry, the procedure is harmless, I will place your pulse oximeter on your finger, don't move and don't speak during the procedure, it will take about a few seconds. Please, put your hand on the table (or on the chest).

10. The main steps of using the pulse oximeter?

- Wash your hands.

Hand washing prevents the spread of infection.

- Remove anything that can absorb light from the surface of the device. For example, if you want to apply the oximeter to your finger, it is important to remove everything that can absorb light (such as dry blood or nail polish) to avoid low false readings.

- Make sure your finger is at room temperature or slightly warmer before starting the procedure.

- High levels of ambient light, such as room lights, phototherapy lights and infrared heaters, can blind the light sensor and give you inaccurate readings.

11. How the pulse oximeter is attached:

- The device is usually placed on the finger. Turn on the oximeter.

- The hand should be placed on the chest at the level of the heart or on the table, rather than being held in the air (which patients usually do). This helps to minimize any movement.

- Minimize movements. The most common cause of incorrect oximeter

readings are excessive movements.

12. How do you read the values indicated by the pulse oximeter?

- The oxygen saturation level and the pulse rate of the patient are shown in seconds on a digital screen. Values from 95% to 100% are generally considered normal. If the oxygen level drops below 85%, you need emergency medical care.

13. How will you explain the result of the patient's pulse oximetry?

- Your oxygen saturation level of hemoglobin is 85%. Oxygen therapy is required.

OR

- Your oxygen saturation level of hemoglobin is 96%. This is an excellent value for hemoglobin saturation with oxygen.

Tests:

1. What is pulse oximetry?

- a. * It is a simple, cheap and non-invasive procedure used to measure oxygen level (oxygen saturation) in the blood.
- b. It is a complex, expensive and invasive procedure used to measure the level of oxygen (oxygen saturation) in the blood.
- c. It is an invasive procedure used to measure the level of oxygen (oxygen saturation) in the blood.

d. It is a simple, inexpensive and non-invasive procedure used to measure blood pressure.

e. It is a simple, cheap and non-invasive procedure, used to check the acid-base balance.

2. Oxygen saturation must always be

a. * Oxygen saturation must always be greater than 95%.

b. The saturation of oxygen must always be less than 95%.

c. Oxygen saturation must always be greater than 98%.

d. The saturation of oxygen must always be less than 85%.

e. Oxygen saturation must always be greater than 99%.

3. In which cases can oxygen saturation be less than 95%?

a. * Oxygen blood saturation may be lower if the patient has respiratory disease or congenital heart disease.

b. In no case.

c. In all cases.

d. In the case of oxygen therapy.

e. No answer is correct.

4. With which device can oxygen saturation of blood be measured?

a. * Pulse oximeter.

b. Tensiometer.

c. Thermometer.

d. Myometer.

e. Barometer.

5. Describe the route of oxygen from the entrance to the body to the cells of the body:

a. * Oxygen enters in the body through the lungs.

b. * From the lungs it penetrates into the blood, where it binds with hemoglobin.

c. * Hemoglobin is a protein located in erythrocytes that transports oxygen through the bloodstream to all parts and tissues of the body.

d. From the lungs oxygen enters the tissues directly.

e. Albumin is a protein that carries oxygen through the bloodstream to all parts and tissues of the body.

6. In what situations is using pulse oximetry to determine oxygen saturation in the blood?

a. * In surgery to evaluate the patient's condition.

b. * To assess whether supplemental oxygen therapy is needed, whether the lung medication is actually effective.

c. * To determine the patient's tolerance to high levels of physical activity.

d. * If the patient suffers from sleep apnea or is in serious medical condition, such as heart attack, congestive heart failure, chronic obstructive pulmonary disease, anemia, lung cancer, asthma, or pneumonia.

e. To monitor blood sugar.

7. How does the pulse oximeter work?

a. * The oximeter uses the hemoglobin characteristic of light absorption and the pulsatile nature of the blood flow in the arteries to measure the oxygen level in the body.

b. * The device has a light source, light detector, and microprocessor, which

compares and calculates the difference in oxygen-rich and oxygen-poor hemoglobin.

c. * One part of the device has a light source with two types of light: red and infrared. These two types of light are transmitted through the body's tissues to the light detector on the other side of the device. More oxygen-saturated hemoglobin absorbs more than infrared light, and at the same time oxygen-free hemoglobin absorbs more than red light.

d. * The microprocessor calculates the differences and converts the information into a digital value. This value is then evaluated to determine the amount of oxygen carried in the blood.

e. The microprocessor calculates the percentage of erythrocytes in the blood as a percentage.

8. How do you explain the purpose of the patient's pulse oximetry procedure?

a. * Now I will measure your oxygen hemoglobin saturation.

b. * This is an important parameter of health, depending on the level of saturation I will prescribe the necessary investigations and treatment.

c. * Do you agree?

d. Do you need it?

e. Nothing should be explained to the patient, he is obliged to accept the investigation.

9. How do you explain to the patients what you want to do when you are going to check their blood saturation with oxygen?

a. * Please don't worry, relax, the procedure is harmless.

b. * I will place your pulse oximeter on your finger

c. * Do not move or speak during the procedure.

d. * The duration of the procedure is a few seconds.

e. Please hold your hand in the air.

10. The main steps of using the pulse oximeter?

a. * Wash your hands.

b. * Remove anything that can absorb light from the surface of the device. For example, if you want to apply the oximeter to your finger, it is important to remove everything that can absorb light (such as dry blood or nail polish) to avoid low false readings.

c. * Make sure the patient's finger is at room temperature or slightly warmer before starting the procedure.

d. * High levels of ambient light, such as room lights, phototherapy lights and infrared heaters, can blind the light sensor and give you inaccurate readings.

e. Hand washing is not mandatory.

11. How the pulse oximeter is attached?

a. * The device is usually placed on the finger.

b. * Turn on the oximeter.

c. * The hand should be placed on the chest at the heart or on the table, rather than held in the air (which patients usually do). This helps to minimize any movement.

d. * Minimize movements.

e. Minimizing movements plays no role.

12. How do you read the values indicated by the pulse oximeter?

a. * The oxygen saturation level and the pulse rate of the patient are shown in seconds on a digital screen.

b. * Values from 95% to 100% are generally considered normal.

- c. * If the oxygen level drops below 85%, emergency medical care is deserved.
- d. Values from 75% to 85% are generally considered normal.
- e. The level of oxygen saturation and the pulse rate of the patient are shown in promilles on a digital screen.

13. How do you explain the result of the patient's pulse oximetry?

- a. * Your oxygen hemoglobin saturation level is 85%. Oxygen therapy is required.
- b. * Your oxygen hemoglobin saturation level is 96%. This is an excellent value for hemoglobin saturation with oxygen.
- c. Everything is under control.
- d. Nothing needs to be explained to the patient, he may be stressed.
- e. Your oxygen saturation level of hemoglobin is 85%. We will repeat in half an hour.