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**CARDIOVASCULAR  
NURSING CARE**

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МИНИСТЕРСТВО ЗДРАВООХРАНЕНИЯ РЕСПУБЛИКИ БЕЛАРУСЬ  
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КАФЕДРА ВОЕННО-ПОЛЕВОЙ ТЕРАПИИ

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**НАБЛЮДЕНИЕ И МЕДИЦИНСКИЙ УХОД  
ЗА ПАЦИЕНТАМИ С ЗАБОЛЕВАНИЯМИ  
СИСТЕМЫ КРОВООБРАЩЕНИЯ**

**CARDIOVASCULAR NURSING CARE**

Учебно-методическое пособие



Минск БГМУ 2020

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Содержит основные сведения об особенностях медицинского ухода за пациентом с заболеваниями сердечно-сосудистой системы, методах контроля за состоянием пациента кардиологического профиля, принципах оказания доврачебной помощи при неотложных состояниях в кардиологии.

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## **НАБЛЮДЕНИЕ И МЕДИЦИНСКИЙ УХОД ЗА ПАЦИЕНТАМИ С ЗАБОЛЕВАНИЯМИ СИСТЕМЫ КРОВООБРАЩЕНИЯ**

### **CARDIOVASCULAR NURSING CARE**

Учебно-методическое пособие

На английском языке

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## EXPLANATORY NOTE

**Total duration of classes** is 6 hours.

Diseases of the cardiovascular system have a leading place in the mortality structure worldwide. With the development of interventional cardiology methods and the expansion of cardiac surgical care, the issue of ensuring proper nursing care for patients with heart disease is particularly actual.

Medical care for a sick patient is one of the most important components of nursing. Its aim is to create favorable conditions for the patient in the hospital by compensating his/her self-care deficiency.

The course of cardiovascular diseases and their prevention is determined by the correct monitoring of patient's state, knowledge of the symptoms of diseases, and the ability to provide first aid in case of an emergency.

**The purpose of the class:** to teach students the medical care methods in case of cardiovascular diseases; to teach students the most common symptoms of cardiovascular disease; to teach methods of first aid in case of emergency cardiovascular events.

**Objectives of the class:**

1. To describe the most common symptoms in cardiovascular diseases and methods of medical care for a patient.

2. To teach students how to monitor the condition of a patient with cardiovascular diseases: to check the arterial pulse, measure blood pressure, assess water balance, record ECG, perform pulse oxymetry, perform 24-hours ECG monitoring (Holter monitoring) and 24-hour ambulatory blood pressure monitoring (ABPM).

3. To teach students how to interpret the findings of pulse, blood pressure measurement and water balance assessment correctly.

4. To teach students how to give first aid to a patient in case of emergency cardiovascular events.

**Initial knowledge level requirements.** To prepare for the class, the student should review the sections "Anatomy of the heart and blood vessels" and "Physiology of the cardiovascular system".

**Test points from related subjects:**

1. Medical ethics principles.
2. Anatomy of the heart and blood vessels.
3. Physiology of the cardiovascular system.

**Test questions on the topic of the class:**

1. List the patient's main complaints in case of cardiovascular diseases.
2. Characteristic features of pain in case of angina pectoris.
3. The main methods of cardiovascular system assessment.
4. The main characteristics of the arterial pulse.
5. The rules of respiratory rate measurement.

6. The rules for ECG recording.
7. Patient preparation for cardiovascular diagnostic tests.
8. Methods for blood pressure measurement.
9. Technique of blood pressure measurement by Korotkoff method.
10. First aid in case of angina pectoris.
11. First aid in case of cardiac asthma.
12. First aid in case of hypertensive crisis.
13. First aid in case of acute vascular insufficiency.

### **PATIENT'S BASIC COMPLAINTS IN CASE OF CARDIOVASCULAR DISEASES**

The cardiological patient's most common complaints are as follows:

1. Cardiac pain (in the heart area or behind the sternum).
2. Shortness of breath and/or attacks with difficulty breathing.
3. Peripheral edemas.
4. Palpitation or arrhythmia (the heart rhythm disorders).
5. Fainting/syncope (loss of consciousness).
6. Complaints associated with a change (increase or decrease) in blood pressure: headache, tinnitus (noise in the head), dizziness.

The most common complaint of a cardiological patient is the cardiac pain. Moreover, often patients who are poorly informed about the anatomical location of the heart do not associate pain behind the sternum, especially its lower third, with heart pathology. Therefore, if the patient complains of pain (or discomfort) in the chest, you have to ask him/her to show where this pain is localized.

Chest pain can have different origin: superficial pain is associated with muscles or bones diseases, deep pain is connected with pleura, esophagus, trachea, heart and other chest organs. It is important to distinguish ischemic pain. The term "ischemia" means the local lack of blood circulation. Ischemic heart pain is related to coronary blood flow disorders due to coronary narrowing or spasm. Coronary pain is characteristic of coronary heart disease (angina pectoris, myocardial infarction). For an attack of angina pectoris the following symptoms are common:

1. The pain is localized behind the sternum or in the left side of the chest.
2. Pain occurs in the form of attack during physical activity, emotional stress.
3. The pain is squeezing (the patient feels tightness or pressure in the chest), sometimes burning.
4. The pain radiates (spreads) to the left shoulder blade, to the neck and left arm.
5. Short duration of pain — a typical attack lasts from 1–5 minutes (rarely up to 10 minutes).
6. The pain quickly disappears at rest (on stopping physical activity) or when taking nitroglycerin under the tongue.

Non-ischemic pain (cardialgia) is associated with non-ischemic changes in the heart, pathology of the pericardium, and neuromuscular diseases of the chest. This pain is often localized in the region of the apex of the heart, is aching or stabbing, is provoked by a variety of factors (deep breathing, coughing, body movements), can be very short (for a few seconds) or very long (for days). Nitroglycerin in case of cardialgia is ineffective.

*Dyspnea* is a disorder of the frequency, rhythm and depth of breathing, accompanied by subjective sensations of lack of air or difficulty breathing. *Cardiac asthma* is an acute attack of shortness of breath that develops as a result of a malfunction of the left heart. The patient takes a forced position while sitting with his legs down from the bed — *orthopnea*. In this position, part of the blood stays in the vessels of the lower extremities, the return of blood to the right heart is reduced, the work of the left heart is facilitated. With untimely medical help, an attack of cardiac asthma can be aggravated by the development of pulmonary edema with the appearance of bubbling noisy breathing, the release of foamy pink sputum from the respiratory tract.

*Fainting (syncope)* is a sudden short-term loss of consciousness, accompanied by an acute pallor, breathing disorders and circulation failure. This is a manifestation of acute cerebral hypoxia due to a temporary decrease or cessation of cerebral blood flow.

*Edema* in case of cardiovascular diseases appears due to the movement of fluid from the vascular bed into the interstitial space due to the high level of systemic hydrostatic venous pressure and a decrease in oncotic blood pressure. Hydrostatic venous pressure rises in patients with heart failure due to weakening of the pumping function of the heart and stagnation of blood in a large circle of blood circulation. Oncotic pressure decreases due to loss of protein in the urine, decreased production of albumin, and other factors. Edema of cardiac origin is localized in the ankles, on the back of the feet, legs and hands. When the patient is bed-ridden, edema appears on the sacrum, in the lumbar region. Edema spread throughout the body with an accumulation of edematous fluid in the cavities is called *anasarca*: in the abdominal cavity (*ascites*), in the pleural cavity (*hydrothorax*), in the pericardium (*hydropericardium*).

## CARDIOVASCULAR SYSTEM ASSESSMENT METHODS

The main methods for monitoring the patient's cardiovascular system state are:

1. Arterial pulse assessment.
2. Blood pressure (BP) measurement.
3. Respiratory rate (RR) measurement.
4. 24-hour diuresis and water balance assessment.
5. Oxygen saturation measurement (pulse oximetry).

6. Electrocardiography (ECG).
7. 24-hour ECG monitoring (24-hour Holter monitoring).
8. 24-hour ambulatory blood pressure monitoring (ABPM).
9. Echocardiography (cardiac echo)

### ARTERIAL PULSE ASSESSMENT

Pulse is a rhythmic oscillation of the artery wall due to a change in its blood supply as a result of contraction of the heart — an expansion of the artery in systole and its decline in diastole. Arterial pulse can be determined on any superficial artery lying on a solid base. The radial pulse assessment is performed most frequently. Equipment: stopwatch or watch with a second hand, antiseptic solution.



*Figure. 1.* The pulse assessment on the radial artery

#### Method for the pulse assessment on the radial artery (Fig. 1).

1. Perform the hand hygiene.
2. Identify the patient.
3. Obtain the informed consent.
4. The patient's position is sitting or lying, the arm is relaxed.
5. The nurse takes the patient's arm. The nurse's thumb is placed on the outer part of patient's wrist, nurse's 2nd and 3rd fingers are located on the inner part of patient's wrist, along the radial edge of the forearm.
6. Assess the following pulse characteristics:
  - **the rhythm** of the pulse is estimated by the duration of the time intervals between successive pulse waves. The pulse can be rhythmic (regular) and arrhythmic (irregular);
  - **pulse rate** — the number of pulse waves per minute. If the pulse is regular, without any arrhythmia, the nurse can count it within 15 seconds and then multiply by 4. If the patient has irregular pulse, the nurse has to count the pulse within 60 seconds. Normally, the heart rate is 60–90 per minute;
  - **volume** of the pulse depends on the amount of blood in the pulse wave. Normally the pulse has a good volume; in case of low cardiac output or low volume of circulated blood (for example, hypovolemia due to bleeding) — the pulse becomes empty (low pulse volume);
  - **tension** of the pulse corresponds to the diastolic blood pressure. A low-tension pulse corresponds to the soft vessel, impalpable between beats. In high tension pulse, vessels are felt rigid even between pulse beats.
7. Say “Thank you” and tell to the patient the obtained results.
8. Perform hand hygiene.
9. Record the result of the pulse assessment in the temperature chart in the patient's medical card (Appendix 1).

## BLOOD PRESSURE MEASUREMENT

**Blood pressure (BP)** is the pressure that blood in the artery exerts on its wall. BP level depends on the value of cardiac output, heart rate, circulating blood volume and total peripheral vascular resistance. BP can be:

- *systolic* blood pressure (during the systole);
- *diastolic* blood pressure (during the diastole).

*Pulse* pressure is the difference between systolic and diastolic blood pressure.

*Mean* arterial pressure is calculated as follows:

$$\text{Mean BP} = \text{Diastolic BP} + 1/3 \text{ Pulse pressure}$$

Normal range for pulse pressure is 74–93 mm Hg.

A systolic blood pressure level 90–139 mm Hg is considered normal. A diastolic blood pressure range is normal from 60 to 89 mm Hg. The measurement result is recorded as a fraction: 120/80 mm Hg. BP lower than 90/60 mm Hg is arterial hypotension. BP 140/90 mm Hg and higher is an arterial hypertension.

**Blood pressure measurement methods.** There are direct (invasive) and indirect (non-invasive) methods for blood pressure measurement. In the direct method, a special needle is used, it is inserted directly into the blood vessel, and this needle is connected to a sphygmomanometer. This method is used in cardiac surgery. An indirect method measurement uses a sphygmomanometer, connected to a cuff on the patient's shoulder. An auscultatory method for measuring blood pressure was invented by the Russian surgeon N. S. Korotkoff, that's why sounds that are heard over the brachial artery during removing of the air from the cuff are called "Korotkoff sounds" (Fig. 2).

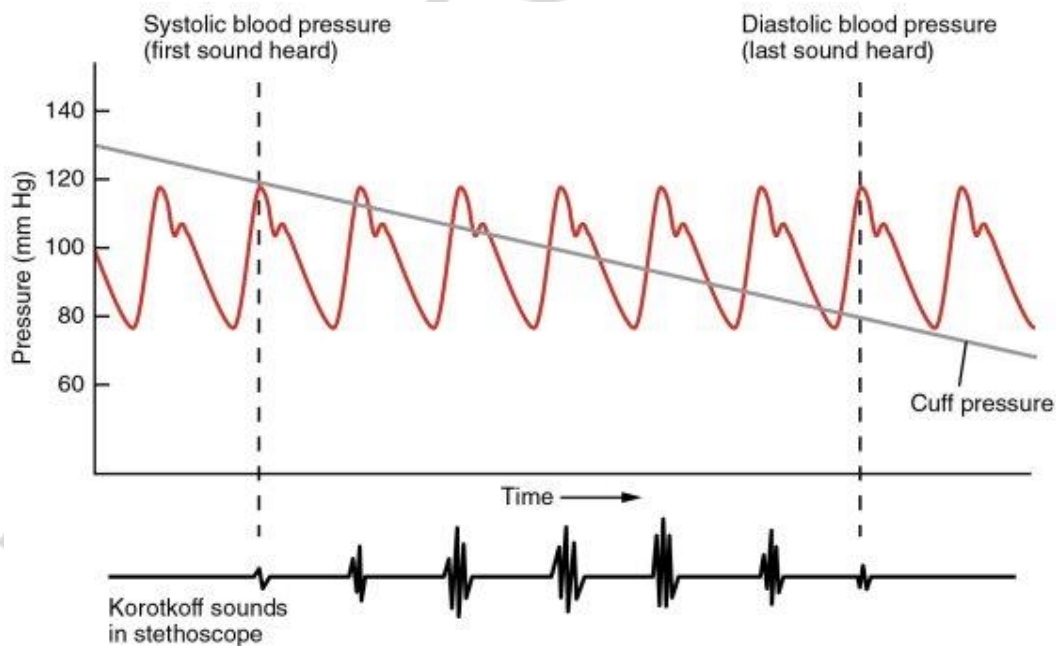


Figure 2. Origin of Korotkoff sounds



Different types of sphygmomanometers are used for taking blood pressure:

- mechanical — to carry out the measurement, mechanical injection of air into the cuff and its gradual removal with the rubber bulb (Fig. 3);
- semi-automatic — air is pumped into the cuff mechanically, but is released automatically (Fig. 4);
- automatic — the air is forced in and out automatically using a compressor (Fig. 5).



Figure 3. Mechanical sphygmomanometer



Figure 4. Semi-automatic sphygmomanometer



Figure 5. Automatic sphygmomanometer

The blood pressure readings taken with semi-automatic and automatic blood pressure devices are displayed on the screen simultaneously with the heart rate.

**Blood pressure taking technique** (Fig. 6). Equipment: sphygmomanometer, stethoscope, antiseptic solution, cotton balls, pen, patient's medical case history:

1. Identify the patient.
2. Obtain the informed consent (10–15 minutes before checking, this time the patient should have a rest).
3. Perform hand hygiene.
4. The patient's position is sitting or lying.
5. The cuff size should be at least 40 % of the shoulder length and at least 80 % of the shoulder circumference (for shoulder circumference from 22 to 26 cm, the cuff size is 12 × 22 cm; for shoulder circumference from 27 to 34 cm

the cuff size is 16 × 30 cm; for shoulder circumference from 35 to 44 cm the cuff size is 16 × 36 cm).



*Figure 6. Blood pressure measurement using Korotkoff method*

6. The patient's arm should be bare, unbent and relaxed.

7. If there is an asymmetry of blood pressure in the arms (the difference between the two arms is 10 mm for systolic BP and the 5 mm Hg for diastolic BP or more) — measurements are made on the arm with the higher BP, in the absence of asymmetry — the measurement is performed at on the left arm for right-handed persons and on the right arm for the left-handed persons.

8. The cuff is applied 2–3 cm above the elbow. One finger should pass freely between the cuff and the patient's skin.

9. Check the position of the gauge needle ("0").

10. Palpate the brachial artery in the elbow fossa area.

11. Insert the stethoscope into the ears and place its membrane on the elbow fossa.

12. Close the pressure gauge valve.

13. Pump the air into the cuff until the pulsation on the radial artery disappears, then 20–30 mm Hg higher.

14. Release the air from the cuff at a speed of 2 mm Hg per 1 second.

15. Mark the pressure level corresponding to the first Korotkoff sound (systolic blood pressure).

16. Continue to release the air at a speed of 2 mm Hg per second.

17. Mark the level of pressure corresponding to the disappearance or sharp weakening of Korotkoff's sound (diastolic blood pressure). To control the complete disappearance of tones, continue auscultation until the cuff pressure decreases by 15–20 mm Hg relative to the last sound.

18. Quickly release the remaining air from the cuff.

19. Repeat the measurement after 2–3 minutes (record the higher blood pressure).

20. The blood pressure readings should be written as a fraction: in the numerator, systolic pressure, in the denominator, diastolic.

21. Report the result to the patient.
22. Remove the cuff from the patient's shoulder.
23. Disinfect the cuff of the sphygmomanometer and the stethoscope membrane.
24. Perform hand hygiene.
25. Report the result of the measurement to the doctor.

### **RESPIRATORY RATE MEASUREMENT**

Respiratory rate (RR) assessment is one of the most important points in the assessment of the patient's state, respiratory rate is a vital indicator. The RR counting should be carried out at rest, the patient's position is lying or sitting, so that you can observe the movements of the chest or front abdominal wall during respiration. Equipment: stopwatch or watch with a second hand, antiseptic solution. The patient should not know that his breathing is being evaluated, as he can hold or accelerate breathing. The breathing assessment is carried out immediately after the pulse measurement, the patient believes that the nurse continues to count the pulse waves.

One inhalation and one exhalation are considered as one respiratory cycle. The RR should be calculated during 1 minute (with a shorter period of time, there is a large error). Normally, RR is 16–20 per minute. RR above 20 per minute is called tachypnea, less than 16 per minute — bradypnea. In addition to the respiratory rate, it is necessary to pay attention to its rhythm (normally regular), type of breathing (in men the abdominal type prevails, in women — the chest type, in children and at a senile age it is mixed), as well as the depth of breathing and the presence of additional sounds (wheezing).

### **WATER BALANCE MONITORING**

**Diuresis** is the process of urine formation and excretion. Sometimes this term is used to denote increased urine secretion. Daily diuresis (24-hours diuresis) is the total amount of urine excreted per day (normally 1.5 liters per day, but it can vary from 0.8 to 2 liters). The urine volume depends on the age, environmental temperature and humidity, nutrition, physical activity, etc. Daily diuresis should be 75–80 % of the amount of liquid intake. Another 20–25 % of the liquid intake is excreted with sweat, breathing, and stools.

The ratio between the amount of liquid consumption and the amount of liquid discharged from the body during the day is called the daily *water balance or fluid balance*. Normally the amount of water consumed including water contained in food (some foods may contain 60 to 80 % water), beverages, and drinking water equal to the amount of water excreted. When assessing the amount of water intake, the nurse should take into account the volume of parenteral solutions. The amount of discharged fluid includes urine, vomiting mass, bleeding, stool (especially in case of diarrhea), wound drainage and stoma output.

**The 24-hour diuresis measurement and fluid balance assessment.** Fluid balance is important in case of the patient's critical condition, dehydration, edemas, when we need to control the action of diuretic drugs. Equipment: graduated container for drinking fluid, graduated container for urine; water balance card, pen.

1. Identify the patient.
2. Explain the course and purpose of the procedure.
3. Obtain the informed consent.
4. At 6.00 a.m., the patient needs to urinate in the toilet (the night urine before this time is not included into calculation for this day).
5. Then, after each urination, urine is collected in a graduated container, its volume is measured.
6. The time and volume of the excreted fluid are recorded in the water balance card.
7. The time and amount of fluid entering the body is also recorded on the water balance card until 6:00 a.m. the next day (Appendix 2).
8. Using the data in the water balance card, the nurse evaluates the water balance:
  - a) the amount of fluid intake is multiplied by 0.8 (80 %) and the calculated amount of urine is obtained;
  - b) the amount of urine excreted by the patient is compared with the amount calculated.

Daily diuresis is considered negative if less fluid is released than calculated. Daily diuresis is considered positive if more fluid is excreted than calculated.

When assessing the water balance, it is also necessary to take into account the patient's height, weight, body temperature, and other factors. Water balance indicates an increase or decrease in the amount of fluid in the body. A positive water balance is noted in case of body fluid retention, increasing edemas (fluid overload). A negative water balance is observed in case of decreasing edemas with effective diuretic therapy (dehydration).

#### **MEASUREMENT OF HEMOGLOBIN OXYGEN SATURATION (PULSE OXIMETRY)**

One hemoglobin molecule can bind to four oxygen molecules. In arterial blood, all the binding sites in the hemoglobin molecule are connected to oxygen and the saturation of hemoglobin with oxygen ( $SpO_2$ ) is 100 %. This means that hemoglobin is completely saturated with oxygen. A pulse oximeter (Fig. 7) is a device that measures  $SpO_2$ . The pulse oximeter consists of a light emitter (red wavelength) and a photo detector. By the amount of light absorbed by the tissues, the degree of



*Figure 7. Pulse oximeter*

saturation of hemoglobin of blood with oxygen is calculated. Pulse oximeters of various designs can measure SpO<sub>2</sub> on a finger, foot or earlobe. The fingers are most commonly used. The skin of the finger should be clean, there should be no varnish on the nail. Normal range SpO<sub>2</sub> is 95–100 %.

A pulse oximeter also displays the heart rate. Pulse oximetry is of great importance in determining hypoxia, since visible changes in the skin and mucous membranes (cyanosis) usually occur only with SpO<sub>2</sub> below 90 %, in some cases, for example, in individuals with dark skin or with anemia, cyanosis can be detected with great difficulty.

### ELECTROCARDIOGRAPHY

Electrocardiography (ECG) is the recording of electrical potentials that occur during heart working. It is advisable to record the ECG in a room protected from external electrical signals. The electrocardiograph must be grounded.

Before registering an ECG (with the exception of emergency cases), the patient should refrain from physical activity for at least 10–15 minutes. It is advisable that after eating 1–2 hours should have passed. Within 1 hour before registering the ECG, the patient should not smoke or drink coffee.

The patient needs to expose the upper half of the body and lower leg, lie on his back, the extend arms along the body (if it is not possible to take a horizontal position, ECG recording is carried out in a half-sitting position). The electrodes are moistened with physiological sodium chloride solution. First, place the electrodes on the limbs, they have a clamp device (Fig. 8):

- the red electrode is placed on the right forearm;
- the yellow electrode — on the left forearm;
- the green electrode — on the left leg;
- the black electrode — on the right leg.

Chest electrodes (Fig. 9) are placed as follows:

- V<sub>1</sub> — 4<sup>th</sup> intercostal space to the right of the sternum;
- V<sub>2</sub> — 4<sup>th</sup> intercostal space to the left of the sternum;
- V<sub>3</sub> — placed diagonally between V<sub>2</sub> and V<sub>4</sub>;
- V<sub>4</sub> — the 5<sup>th</sup> intercostal space on the left midclavicular line;
- V<sub>5</sub> — the same level as V<sub>4</sub>, but on the anterior axillary line;
- V<sub>6</sub> — the same level as V<sub>4</sub>, but on mid axillary line.



Figure 8. Limb electrodes



Figure 9. Chest electrodes



With pronounced chest hair, the places for the chest electrodes are moistened with water or a special gel.

Modern electrocardiographs are able to record ECG in an automatic or manual mode. When registering an ECG in an automatic mode, standard settings are used (previously set). When recording in an manual mode, before recording the ECG, it is necessary to check the amplitude of voltage (the standard calibration of the signal amplitude gain is 1 mV equal to 10 mm) and the graph paper speed (25 mm/s or 50 mm/s). ECG recording is carried out with the patient's calm breathing and with a breath held on inhalation, it is necessary to record at least 5–7 QRS complexes in each lead (5–10 seconds). After the end of the ECG recording, the electrocardiograph is turned off, the electrodes are disconnected from the patient's body, and the patient is allowed to dress. On the ECG paper you have to record the patient's full name, age, date of birth, date and time of ECG recording. The patient should provide the doctor with the previous ECG for comparison.

### 24-HOUR ECG (HOLTER) MONITORING

24-hour ECG monitoring (Holter-ECG) is a modern method of evaluating the activity of the heart, in which the ECG is recorded for 24 hours or more. Standard ECG duration is very short (seconds), it is difficult to record some heart rhythm disorders, episodes of ischemia, especially if they arise not at rest (when the patient is lying), but on physical activity (Fig. 10).

Before conducting 24-hour ECG monitoring, the essence of the procedure is explained to the patient. In case of abundant body hair, patients need to shave the hair on the front surface of the chest. The electrodes are attached to the chest with special disposable sticky elements and connected to the monitor using a cable. The monitor is fixed



Figure 10. 24-hour ECG monitoring

on the belt or worn on the neck on a belt (Fig. 10). The patient should refrain from water procedures (bath, shower, pool) during monitoring, since water can damage an expensive device. A mobile phone and other electrical devices placed near the monitor may cause interference. The patient needs to record physical and emotional activity, medication and symptoms in a special diary for analysis by the doctor. After connecting the monitor, the patient should adhere to the usual regimen of the day. After a day, at the appointed time, the patient should come for a visit to complete the procedure. The recorded ECG is processed on a computer with a special program, then the doctor analyzes the results. The monitor cover and electrode cables are disinfected.

## 24-HOUR AMBULATORY BLOOD PRESSURE MONITORING

24-hour ambulatory blood pressure monitoring (ABPM) — a method for blood pressure assessment. The automatic device measures BP at certain intervals (usually during the day every 30 minutes, at night every 60 minutes). The patient wears a cuff on the shoulder attached to the device (monitor), which is mounted on the belt or on the tape over the shoulder (Fig. 11).



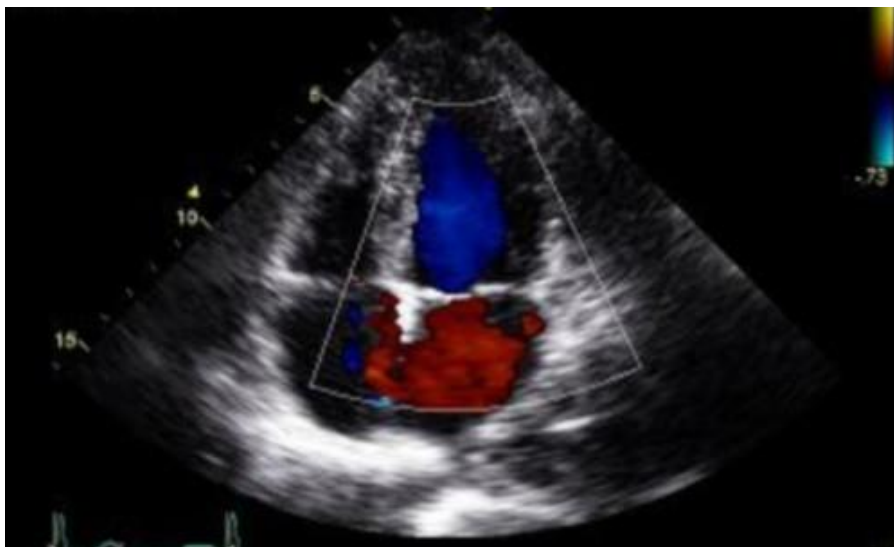
*Figure 11. 24-hour ambulatory blood pressure monitoring*

The results of ABPM provide valuable information about the blood pressure in the patient's normal daily life and allow you to adjust the treatment, diagnose the so-called “white coat hypertension”, in which the patient's blood pressure rises only when measured by a medical professional.

Before conducting the ABPM, the nurse explains the patient the essence of the procedure. The patient should keep his arm steady and relaxed during the measurement of blood pressure (if the arm muscles are tensed at the time of measurement, this will distort the results). The patient should refrain from water procedures during blood pressure monitoring, since water can damage a monitor. Mobile phone and other electrical devices placed near the monitor can cause interference. The patient needs to record physical activity, medication and symptoms in a special diary for analysis by a doctor. After connecting the monitor, the patient should adhere to the usual activity. In a day, at the appointed time, the patient should come for a visit to the clinic to complete the procedure. The results are analyzed on a computer. The cuff, cable and monitor cover are removed and disinfected.

## ECHOCARDIOGRAPHY

Ultrasound heart examination is called echocardiography. Echocardiography is based on the ability of ultrasound waves to be reflected and absorbed by body tissues to varying degrees. Echocardiography allows you to evaluate the structural characteristics of the heart (chamber sizes, wall thickness), as well as the of blood flow (Fig. 12).



*Figure 12. Echocardiography*

Echocardiography does not need any special preparation; however, the patient usually has to bring a recently recorded ECG and the results of previous echocardiography for comparison.

### **NURSING CARE IN CASE OF CARDIOVASCULAR DISEASES**

Nursing observation and care for the cardiological patient should be especially careful. Cardiological patients are usually irritable, have an instable mood, sleep disturbances, anxiety, and fear of sudden death. The nurse should explain to the patient the essence of the disease, help relieve all his fears and anxieties, reassure and support him, and explain that following all medical recommendations will contribute to a rapid recovery. It is necessary to find a proper way of conversation with each patient with patience, tact, and well-wishing. Only kindness, attention and a smile will help to establish contact.

The nurse should be well aware of novel medicines and explain to the patient the time of taking certain medicines, and their effect. The role of the nurse in diet therapy is very important. It is necessary to explain to the patient the value of proper nutrition, lifestyle correction, rejection of bad habits.

The nurse monitors the patient's individual raining, assesses the dynamics of the condition before and after physical exercises.

There are no unimportant things in the nurse's work. The patient's life and success of treatment depend on the accuracy of the nurse's actions.

Professional care for a seriously ill patient is, first of all, the highest quality care. The art of professional care means the care is not carried out for a patient with any disease, but for a person who has individual characteristics, habits, desires. Creating favorable conditions for the patient, a delicate and tactful attitude are the conditions for high-quality nursing care. Practice shows that people feel



better and recover faster when their desire for self-care is encouraged. If the patient has the opportunity to participate in the care planning, to receive explanations, then he perceives his care better, his mood improves, his quality of life increases.

**Patient's personal hygiene.** The importance of personal hygiene is well reflected in the statement of Florence Nightingale in the "Notes on Nursing": "the greater part of nursing consists in preserving cleanliness". A sick person often needs help with personal hygiene. In this part of the care process, the nurse's hands become the hands of the patient.

To wipe your hands, you need to use paper towels, as cloth towels can contain microorganisms. Patients need to wash their hands after using the toilet, before and after eating — this simple measure will help to avoid the occurrence and spread of various infections. Hand skin requires special care: the appearance of cracks increases the risk of infection. The proper skin care is the basis for the prevention of pressure sores for a seriously ill patient.

*Genital hygiene* (especially important for women) is necessary not only to maintain health, but also to feel comfortable. In the performance of genital hygiene, all movements should be done in the direction from the urethra to the anus. This is necessary to prevent urinary tract infections, because their causative agents are microorganisms — the natural inhabitants of the intestine.

*Hair care.* The frequency of the procedure can range from daily washing to 1 time per week. The decision is taken individually — the hair is washed as often as necessary.

When taking care of the nails, special attention should be paid to the skin around the nail bed, since the barbs can serve as an entrance gate for infection.

An integral part of all preventive measures is the care of your teeth and oral cavity.

Thus, when taking care of the seriously ill patient, the nurse should help the patient to carry out the following *personal hygiene procedures*:

1. Morning and evening hygiene: eyes hygiene, nose hygiene, ears hygiene.
2. Hand washing before each meal and using the toilet.
3. Skin hygiene: wiping the patient daily or assisting with a bath/shower.
4. Genital hygiene in the morning, evening and after using the urinal.
5. Hair care: hair washing at least 1 time per week, combing it at least 2 times a day, shaving 1 time per 1–2 days.
6. Mouth hygiene: rinsing the patient's mouth after each meal, tooth brushing or dentures care (2 times a day).
7. Nail care: nail cutting 1 time per week.
8. Bedsore prevention.

**Modern principles of patient care:**

1. Safety — prevention of the patient's injuries.
2. Confidentiality — protection of the patient's privacy. The details of the patient's personal life should not be known to other people.

3. Respect for dignity — implementation of all procedures with the patient's consent, ensuring his/her privacy (if necessary).
4. Independence — encouraging of the patient's independence.
5. Infectious safety — prevention of the microorganisms transmission.

Performing all the procedures the nurse should take into account these principles and include the following steps.

#### **General Preparation for a Procedure:**

1. Ensure that you have the correct patient for the correct procedure. Identify the patient (ask his/her name and date of birth and check this information with the patient's name band and list of prescription).

2. Explain to the patient the aim and course of the procedure, taking into account the patient's psychological characteristics. Such an explanation helps to reduce the stress, create a trusting attitude, and motivates the patient to cooperate.

3. Obtain the patient's informed consent for the procedure (the patient's rights to receive information are respected).

4. Provide the patient with the possible privacy (place a curtain or a screen).

5. Perform hand hygiene (infection prevention and control).

6. Use gloves as needed (infection prevention and control). Gloves should be used during all patient-care activities that may involve exposure to blood and all other body fluids (including contact with mucous membranes and non-intact skin).

7. Prepare the necessary equipment.

#### **The Finishing of a Procedure:**

1. Help the patient to take a comfortable position (ensuring safety — injury prevention).

2. Remove and disinfect the used equipment (infection prevention and control).

3. Remove gloves and perform the hand hygiene (infection prevention and control).

4. Record the performed procedure and its result in the medical card.

### **MEDICAL CARE OF THE PATIENT IN CASE OF EDEMA**

1. It is necessary to provide the patient with a bed rest, psychological comfort in order to reduce the load on the cardiovascular system.

2. The protective properties of the skin are reduced in case of edema. Cracks, diaper rash, bedsores may occur, and give rise to the infection. The patient needs a comfortable bed without any folds or seams.

3. Water balance. The nurse has to measure the amount of daily fluid that the patient drinks and excretes with urine. The nurse monitors the patient's compliance with the doctor's recommendations to limit the fluid consumption (in chronic heart failure it should be less than 1–1.5 liters per day), assesses the effectiveness of the diuretic therapy.

4. Blood congestion in the abdominal cavity organs causes their function disorders, which leads to a decrease in appetite, the appearance of nausea, vomiting, a feeling of heaviness in the abdomen. The patient has to follow a diet with a limited amount of sodium and water, but with high amount of easy-digested proteins. The nurse should pay attention to the patient's normal bowel movement, as it improves the patient's well-being. If the patient has had no stool for 2 days or more, it is necessary to inform the attending physician who can prescribe laxatives or a cleansing enema.

## **FIRST AID IN CASE OF CARDIOVASCULAR EMERGENCIES**

### **FIRST AID IN CASE OF ANGINA PECTORIS (HEART ATTACK)**

If an angina attack occurs, you have to:

1. Calm down the patient and prevent any physical activity.
2. To provide an influx of fresh air, loose the tight clothes. Provide oxygen supply.
3. Call in a doctor.
4. Monitor the pulse, blood pressure, respiratory rate. With arterial hypotension (blood pressure equal to 90/60 mm Hg or lower), the patient should be in the horizontal position. A semi-sitting position is better in case of normal or high blood pressure.
5. Give the patient an uncoated tablet (250–300 mg) of *acetylsalicylic acid* (*aspirin*); ask the patient to chew it and then to swallow it.
6. Give one tablet of *nitroglycerin* (0.5 mg) sublingually (if the systolic blood pressure is 100 mm Hg or more) or two doses of nitroglycerin spray sublingually (under the tongue). Nitroglycerin may be a cause of headache, associated with the cerebral veins dilatation. To reduce this headache, you can give the patient a tablet of *validol* with nitroglycerin sublingually (it has a tonic effect on the brain veins). If the chest pain has not subsided, nitroglycerin administration is repeated twice more with a 5-minute interval.
7. If the duration of pain attack is 15 minutes or more, record an ECG, as there is a risk of myocardial infarction.

### **FIRST AID IN CASE OF CARDIAC ASTHMA**

Cardiac asthma is a condition secondary to heart failure that is marked by dyspnea, wheezing, cough, and rales. Cardiac asthma can transfer to the pulmonary edema with frothy or bloody sputum production. Cardiac asthma and pulmonary edema often develop at night, while lying down, in elderly patients and can be a complication of hypertensive crisis, myocardial infarction, a decompensated valve heart defect. In case of cardiac asthma, it is necessary to:

1. Urgently call in a doctor (outside the hospital — call the ambulance, in the hospital — call the doctor on duty).

2. Calm down the patient.
3. Help your patient sit down in a comfortable position, move the lying patient to a half-sitting position (lift the head side of the bed — orthopnea position).
4. Monitor the heart rate, blood pressure, respiratory rate. In the presence of a pulse oximeter, assess hemoglobin saturation with arterial oxygen (normal value is above 95 %).
5. Provide access to fresh air, loosen the tight clothes from the chest.
6. Provide moist oxygen inhalation via nasal cannula or face mask (use antifoam agents instead of water to humidify oxygen — 70 % ethanol).
7. Give one tablet of *nitroglycerin* (0.5 mg) sublingually, if the blood pressure is 100/60 mmHg or more, or two doses of nitroglycerin spray sublingually (under the tongue). Nitroglycerin administration can be repeated twice with a 5-minute interval.
8. Record an ECG.
9. Prepare the necessary equipment (syringes and infusion system for intravenous injection, solutions for intravenous administration (“pulmonary edema” set), tourniquet, antiseptic solutions, sterile cotton balls).
10. Patients in a serious state (systolic blood pressure below 90 mm Hg, heart rate above 120 or below 40 per minute, RR above 25 or below 8 per minute, SpO<sub>2</sub> < 90 %) should be provided with a venous access within the first minutes. Perform peripheral vein catheterization.
11. If the arrival of the ambulance within a short term is impossible (in distant geographical locations or in bad weather conditions), a venous tourniquet must be applied to the thigh (15 cm below the inguinal fold) in order to deposit blood in the general (systemic) circulation and delay its flow to the lungs. After 15–20 minutes, you need to shift the tourniquet to the other leg. The venous tourniquet is applied with a moderate force: the skin of the limb below the tourniquet should become cyanotic, the pulse on the peripheral arteries below the tourniquet should be present.

### **FIRST AID IN CASE OF HYPERTENSIVE CRISIS**

Hypertensive crisis is a complication of arterial hypertension. This is a severe elevated blood pressure (systolic BP more than 180 mm Hg, diastolic BP more than 110 mm Hg) with headache, dizziness, nausea, vomiting, blurred vision, shortness of breath, chest pain, problems with thinking or behavior changes (confusion). Main categories of hypertensive crises include *hypertensive emergency* (severe blood pressure elevation plus target organs damage: the retina, kidneys, heart, arteries, and brain impairment) and *hypertensive urgency* (severe blood pressure elevation without evidence of end-organ dysfunction). First aid of hypertensive crisis includes:

1. Provide the patient with physical and mental comfort.

2. Ask the patient to lie down in a horizontal position with elevated head (orthopnea).
3. Provide an influx of fresh air.
4. Call in a doctor.
5. Monitor the patient's blood pressure and pulse.
6. In case of pain in the heart give the patient a tablet of nitroglycerin (0.5 mg) sublingually.
7. Apply a cold compress to the patient's forehead.
8. Ask your patient about his/her usual medication. Hypertensive crisis may be caused by missing the medication doses, in such a case the patient should take his tablets. In the absence of allergies, you can give the patient a *captopril* tablet (25–50 mg) under the tongue. In case of tachycardia (pulse above 100 beats per minute) you can administer *propranolol* 10 mg (for chewing). In case of the patient's severe emotional arousal you can use sedative herbs (medications on the basis of valerian, motherwort, hawthorn).
9. In case of hypertensive emergency the nurse has to provide venous access within the first minutes: to catheterize the peripheral vein.

#### **FIRST AID IN CASE OF ACUTE VASCULAR INSUFFICIENCY**

Acute vascular insufficiency includes syncope (fainting), collapse and shock.

Syncope is a sudden short-term loss of consciousness. The most often cause of syncope is a short-term decrease in cerebral blood supply as a result of a decrease of vascular tone. Fainting can occur as a result of stress, severe pain, cardiac arrhythmias. Fainting lasts from a few seconds to one minute, rarely longer. On examination, the patient's skin is pale, the pulse is rare and faint, blood pressure is low.

Collapse and shock are the forms of acute vascular insufficiency, based on cardiac output decrease. In such a case the cardiac output is not sufficient for normal tissue supply. Collapse is a moderate form of vascular insufficiency (hypotension is the main symptom). Shock is the most severe form of vascular insufficiency. Shock leads to the acute metabolic disorders, microcirculation, the organs and systems disturbance. The causes of collapse and shock are the following: severe bleeding, myocardial infarction, heart rhythm disorders, severe infection, poisoning, trauma. With any type of collapse or shock you can observe hypotension, the patient's skin is moist, cold and cyanotic, sometimes with a "marble" pattern. The patient's consciousness is inhibited, but is present, pulse is frequent and thready, breathing is shallow.

When giving first aid to a patient with acute vascular insufficiency, it is necessary:

- to ensure complete physical immobility;
- to call in a doctor;

- to help the patient to lie down in a horizontal position without a pillow with a raised foot of the bed to 45° (Trendelenburg position) to increase the brain circulation;
- to provide fresh air and/or oxygen inhalation;
- to loosen tight clothes;
- to keep the patient warm (use a blanket);
- to monitor the pulse, respiratory rate, blood pressure;
- to irritate the vasomotor centers, it is possible to give the patient to inhale ammonium vapours or sprinkle the patient’s face with cold water;
- in case of the patient’s serious condition (suspected shock) the nurse has to provide venous access within the first minutes: to catheterize the peripheral vein.

The treatment of collapse and shock requires intensive treatment at the intensive care unit.

### ASSIGNMENT FOR INDEPENDENT WORK

1. Palpate the arterial pulse in the radial artery of a healthy volunteer and cardiac patient. Evaluate the characteristics of the pulse: rhythm, rate, volume.
2. Using a mechanical sphygmomanometer and stethoscope check the blood pressure with of several healthy volunteers and patients in the cardiology department. Compare the results.
3. Evaluate the patient’s water balance using the data in the water balance card below.

#### Water balance card example

Time	Fluid input, ml	Time	Fluid output, ml
9.00 breakfast	200	8.00	150
10.00 water	100	12.00	300
12.00 intravenous infusion	400	13.00	100
14.00 lunch	350	16.00	150
16.00 tea	100	17.30	150
18.00 water	200	21.00	100
19.00 dinner	200	22.00	200
22.00 yogurt	200	2.00	200
6.00 water	100	6.00	300
<b>Total fluid input</b>		<b>Total fluid output</b>	

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## TEMPERATURE CHART

№ карты			ТЕМПЕРАТУРНЫЙ ЛИСТ														№ палаты	
Фамилия, и., о. больного																		
Дата																		
День болезни																		
дата пребыв. в стац.			1	2	3	4	5	6	7	8	9	10	11	12	13	14		
П	АД	T°	у	в	у	в	у	в	у	в	у	в	у	в	у	в	у	в
140	200	41																
120	175	40																
100	150	39																
90	125	38																
80	100	37																
70	75	36																
60	50	36																
Дыхание																		
Вес																		
Выпито жидкости																		
Суточн. колич. мочи																		
Стул																		
Ванна																		

**WATER BALANCE CARD**

Date \_\_\_\_\_

Hospital \_\_\_\_\_

Department \_\_\_\_\_

Room # \_\_\_\_\_

Patient's surname \_\_\_\_\_

Patient's name \_\_\_\_\_

Age \_\_\_\_\_

Body weight \_\_\_\_\_

Diagnosis \_\_\_\_\_

<b>Time</b>	<b>Fluid input, ml</b>	<b>Time</b>	<b>Fluid output, ml</b>
<b>Total fluid input</b>		<b>Total fluid output</b>	



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