HYGIENIC ASSESSMENT OF WORKING CONDITIONS AND OCCUPATIONAL MORBIDITY OF CARDIAC SURGEONS

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Abstract: *This paper examines the specifics of the working conditions of cardiac surgeons and the impact of harmful and dangerous industrial factors on their health. The professional activity of cardiac surgeons is accompanied by high physical and psycho-emotional stress, as well as the impact of a complex of unfavorable factors of the industrial environment. The main groups of factors — physical, chemical, biological and psychophysiological — and their importance in the formation of occupational morbidity are analyzed. Special attention is paid to the issues of hygienic assessment of working conditions and preventive measures aimed at reducing occupational risks and maintaining the working capacity of specialists.*

Keywords: *cardiac surgeons, working conditions, harmful industrial factors, occupational morbidity, hygienic assessment, physical factors, chemical factors, biological factors, psychophysiological stress, prevention.*

Introduction: Cardiac surgery is one of the most complex and high-tech areas of modern medicine, requiring maximum concentration of attention from specialists, high precision of actions and significant physical and psycho-emotional costs. The working conditions of cardiac surgeons are characterized by long-term surgical interventions, work in a strictly regulated operating environment and constant responsibility for the patient's life[4]. In the course of their professional activities, cardiac surgeons are exposed to a complex of harmful and dangerous industrial factors of various nature, which can adversely affect the functional state of the body. These factors, with prolonged exposure, contribute to the development of fatigue, decreased performance, and the formation of occupational diseases. In this regard, a hygienic assessment of the working conditions of cardiac surgeons is an urgent task, which makes it possible to identify the main occupational risks and develop effective preventive

measures. Studying this problem is important for preserving the health of medical workers and improving the quality of surgical care.

The purpose of the work: To conduct a hygienic description of the working conditions of cardiac surgeons and to consider the main harmful and dangerous industrial factors affecting medical workers in the course of their professional activities. To study the influence of physical, chemical, biological and psychophysiological factors on the health of cardiac surgeons, as well as to analyze the most common professionally caused diseases and the main measures of their prevention.

Research methods: The work used methods of analysis and generalization of scientific literature on occupational hygiene, occupational pathology and working conditions of surgical medical workers. A review of literature sources, regulatory and scientific data on the problem of the impact of harmful industrial factors on the body of cardiac surgeons is carried out.

A descriptive method was also used, which made it possible to characterize the main physical, chemical, biological and psychophysiological factors of the professional environment and their impact on the health of specialists. The method of logical analysis was used to systematize the data obtained.

Hygienic characteristics of the working conditions of cardiac surgeons.

The work of cardiac surgeons belongs to the category of intense mental and physical labor and is carried out mainly in the operating unit[3]. Professional activity is characterized by a high psycho-emotional burden due to responsibility for the patient's life, the risk of complications and the need to make quick decisions in critical situations. An important feature is a prolonged stay in a forced working position (more often standing, with an inclination), which is accompanied by a significant static load on the musculoskeletal system[16].

The work requires high concentration of attention, precision and coordination of movements, as well as constant visual tension when performing complex surgical procedures. The duration of surgical interventions can reach 6-10 hours or more, which leads to severe fatigue, decreased performance and an increased risk of developing professionally determined disorders.

Harmful and dangerous production factors.

Harmful and dangerous industrial factors are an integral part of the professional activities of cardiac surgeons and largely determine the hygienic characteristics of their work. Working in an operating room is accompanied by the impact of a complex of adverse factors of various nature, which can have both acute and chronic effects on the specialist's body. These effects affect various body systems and, with prolonged or regular contact, can lead to the

development of functional disorders, decreased performance and the formation of occupational diseases.

The peculiarity of the work of cardiac surgeons is a combination of high physical activity, pronounced nervous and emotional stress and constant contact with a potentially dangerous environment. The impact of harmful factors is enhanced by the duration of surgical interventions, the need to maintain a static body position and a high degree of responsibility for the patient's life. In such conditions, even relatively moderate in intensity factors can acquire significant hygienic significance due to their complex and long-term effects.

All harmful and dangerous occupational factors affecting cardiac surgeons are usually divided into several main groups, depending on their nature and mechanism of action: physical, chemical, biological and psychophysiological factors. This division makes it possible to more accurately assess working conditions, identify the main risks and develop effective measures to prevent occupational morbidity.

1. Physical factors

Physical factors occupy an important place among the adverse effects that cardiac surgeons face while working in the operating room. These include a special indoor microclimate characterized by low air temperature and strictly controlled sterility conditions. Prolonged exposure to such a microclimate can contribute to hypothermia, reduce work comfort, and develop functional stress in the body.

A significant factor is also the noise impact caused by the operation of medical equipment, including artificial circulatory devices, monitors and ventilation systems. Constant noise exposure, even at moderate levels, leads to increased fatigue, decreased concentration, and increased nervous and emotional tension[3].

Special attention is paid to the illumination of the operating field, which should be intense and focused. However, prolonged work in bright artificial light causes visual fatigue and overstrain of the visual analyzer. Additionally, the effects of ionizing radiation should be taken into account when using X-ray monitoring methods during operations, which, with repeated exposure, requires strict compliance with radiation safety[1].

2.Chemical factors

Chemical factors in the working conditions of cardiac surgeons are associated with exposure to various chemicals that are used in the operating room and auxiliary rooms. The main importance is inhalation anesthetics, disinfectants and antiseptics, as well as some medications used during surgery[10].

Inhaled anesthetics (for example, nitrous oxide, sevoflurane, isoflurane) may leak from the respiratory circuit into the operating room air. With chronic exposure, even in low concentrations, they can have a neurotoxic effect, manifested by headaches, decreased

concentration, fatigue, and possible effects on liver and reproductive system functions during prolonged contact.

Disinfectants such as chlorine compounds, hydrogen peroxide, alcohol solutions, and aldehyde-containing preparations (such as formaldehyde and glutaraldehyde) are used to treat surfaces and tools. Their vapors and aerosols can irritate the mucous membranes of the eyes and respiratory tract, lead to dry skin, contact dermatitis and allergic reactions[7]. With repeated exposure, sensitization and occupational bronchial hyperreactivity may develop.

Medications, including cytostatics and some cardiotropic drugs, can also pose a risk if safety regulations are violated. Their aerosol forms or accidental contact can have a toxic and allergenic effect on medical personnel.

3. Biological factors

Biological factors in the work of cardiac surgeons are associated with constant contact with blood, body fluids and tissues of patients, which creates a risk of occupational infection[13]. The most significant danger is caused by pathogens of parenterally transmitted infections.

These include the human immunodeficiency virus, hepatitis B and C viruses, which can be transmitted by accidental needle injections, tool cuts, or ingestion of infected material on damaged skin and mucous membranes[17]. The combination of high virulence and low infectious dose of some pathogens, as well as the possibility of latent course of diseases in patients, is particularly dangerous.

In addition to viral infections, bacterial agents, including antibiotic-resistant hospital flora, pose a potential risk. Contact with such microorganisms can occur in violation of asepsis and antisepsis during surgical procedures.

4. Psychophysiological factors.

Psychophysiological factors in cardiac surgeons are associated with high nervous and emotional stress and tension of the body's functional systems. The main factor is the constant responsibility for the patient's life, which creates a pronounced stressful background during surgery.

A significant role is played by the prolonged static position of the body during surgical interventions, which leads to overstrain of the muscles of the back, neck and lower extremities, as well as disruption of peripheral blood circulation. This contributes to the development of chronic fatigue and pain syndromes of the musculoskeletal system.

An additional effect is provided by high concentration of attention for a long time, the need for quick decision-making in conditions of time constraints and the risk of complications. This leads to an overstrain of the central nervous system, a decrease in cognitive stability and the development of fatigue. Occupational morbidity of cardiologists

The occupational morbidity of cardiac surgeons is formed under

the influence of a complex of harmful and dangerous industrial factors characteristic of their activities. Prolonged exposure to physical, chemical, biological, and psychophysiological stress leads to the development of functional and organic disorders of various organs and systems. The peculiarities of work, including high responsibility, long-term operations and irregular working hours, contribute to the formation of chronic diseases and conditions of overwork[2].

In the structure of occupational morbidity of cardiac surgeons, there are several main groups of pathologies, each of which has its own characteristics of formation and clinical course[15]. The following are the most significant of them.:

1.Diseases of the musculoskeletal system

Diseases of the musculoskeletal system are one of the most common occupational pathology groups in cardiac surgeons. Their development is associated with prolonged static body position during operations, forced posture (standing, with the trunk tilted forward), as well as the lack of the possibility of frequent position changes and full-fledged muscle relaxation[16].

Osteochondrosis in cardiac surgeons develops mainly in the cervical and lumbar spine. The reason is the prolonged static tension of the back and neck muscles during operations, as well as the constant tilt of the head when working in the operating field. This leads to impaired blood supply to the intervertebral discs, their degeneration, and the gradual development of pain, stiffness, and chronic discomfort[9].

Myofascial pain syndrome. This condition is associated with overexertion of certain muscle groups, especially the muscles of the neck, shoulder girdle and back. In cardiac surgeons, it occurs due to prolonged retention of a fixed position and high precision of manipulation without the possibility of relaxation. Painful muscle seals (trigger points) are formed, accompanied by constant or periodic pain and decreased performance[16].

Varicose veins in cardiac surgeons develop due to prolonged standing during surgery without sufficient physical activity. Static load leads to impaired venous outflow, increased pressure in the veins of the lower extremities and gradual expansion of the venous wall. It is clinically manifested by a feeling of heaviness in the legs, edema and vascular changes[5].

2. Cardiovascular diseases

Arterial hypertension is one of the most common conditions in cardiac surgeons. Its development is associated with chronic stress during operations, emotional overstrain and constant concentration of attention. Activation of stress mechanisms causes peripheral vascular spasm and an increase in total peripheral resistance, which eventually leads to a persistent increase in blood pressure[10].

Coronary heart disease in cardiac surgeons is formed against the background of prolonged psychoemotional stress and increased load on the myocardium. The constant activation of the sympathetic nervous system increases the heart's oxygen demand, and vascular spasm worsens the coronary blood supply. This creates conditions for the development of myocardial ischemia, manifested by angina pectoris and decreased exercise tolerance[8].

Cardiac arrhythmias (extrasystole, sinus tachycardia) in cardiac surgeons are often associated with acute or chronic stress, lack of sleep, and fatigue. Increased myocardial excitability against the background of an imbalance of the autonomic nervous system leads to episodic or permanent rhythm disturbances, which can increase during periods of intense work[5,6].

3. Neuropsychiatric disorders

Burnout syndrome is one of the most common conditions. It is manifested by emotional exhaustion, decreased motivation to work, a feeling of professional fatigue and a cynical attitude towards patients. The main reason is prolonged psychoemotional overstrain, lack of full recovery and constant stress during complex operations[11].

Chronic fatigue develops against the background of prolonged surgeries, night shifts and disturbed sleep patterns. It is manifested by decreased performance, rapid fatigue, impaired concentration, and slower reactions. The reason is exhaustion of the nervous system due to lack of rest and constant overload[1].

Anxiety and depressive disorders are formed with prolonged exposure to stressful factors, especially with complicated operations or unfavorable

outcomes. They are manifested by constant internal tension, decreased mood, sleep disorders, and decreased interest in professional activities.

It should be noted that neuropsychiatric disorders are one of the most significant and clinically pronounced problems in the professional activity of cardiac surgeons, since they directly affect not only the health status of a specialist, but also the quality and safety of surgical care.

Prevention of occupational diseases

The prevention of occupational diseases in cardiac surgeons is aimed at reducing the effects of harmful and dangerous industrial factors, maintaining working capacity and preventing the development of chronic pathology. It should be comprehensive and include organizational, hygienic and individual measures aimed at optimizing working conditions and working hours[14,13].

1. Organizational measures

Organizational measures are aimed at reducing the professional burden and rationalizing the work of cardiac surgeons. Proper planning of the operating day is important, taking into account the complexity of interventions and mandatory rest breaks[2].

It is necessary to limit excessively long operations, evenly distribute the workload among the members of the operating team and comply with working time standards. Proper organization of shifts is essential to ensure adequate recovery between shifts.

Staff rotation is also used to reduce the long-term effects of the same type of stress and stress factors. All these measures help to reduce the risk of overwork and occupational diseases.

2. Sanitary and hygienic measures

Sanitary and hygienic measures are aimed at creating a safe working environment in operating rooms and reducing the impact of harmful factors on cardiac surgeons. It is important to ensure an optimal microclimate, including temperature, humidity control and an effective ventilation system that prevents the accumulation of anesthetics and other chemicals in the air.

Strict observance of the sanitary and epidemiological regime is necessary: regular disinfection of premises, sterilization of instruments and cleanliness control of the operating unit. This reduces the risk of biological contamination and occupational infection[17,13].

It is also important to organize rational lighting of the surgical field, eliminating excessive visual load, and monitoring noise levels from medical equipment. All these measures combined contribute to reducing the overall harmful effects of the work environment and preserving the health of cardiac surgeons

3. Individual protection

The individual protection of cardiac surgeons is aimed at preventing contact with harmful and dangerous factors during work. The main importance is the use of personal protective equipment, including sterile gloves, masks, safety glasses and surgical gowns, which prevent contact with body fluids and reduce the risk of infection[13].

When working with ionizing radiation sources, radiation protection devices such as lead aprons and screens are used to reduce the dose burden on the body. This is especially important when performing operations with X-ray control.

To reduce the effects of chemical factors, respirators or local ventilation systems are used to reduce inhalation of anesthetic and disinfectant vapors. Compliance with the rules of asepsis and antisepsis also plays an important role, which reduces biological risks..

4. Medical prevention

Medical prevention is aimed at early detection and prevention of occupational diseases in cardiac surgeons. It includes regular preventive medical examinations that allow timely detection of disorders of the cardiovascular, nervous and musculoskeletal systems.

Outpatient monitoring of the health status of specialists is important, taking into account the length of service and the nature of the workload. If necessary, additional examinations are carried out for the early diagnosis of occupational diseases[14].

Psychological support and counseling aimed at reducing stress levels and preventing burnout also play an important role. An integrated approach to medical prevention helps to preserve the health of cardiac surgeons and increase their efficiency.

Conclusion: The working conditions of cardiac surgeons are characterized by the effects of a complex of harmful and dangerous industrial factors, including physical, chemical, biological and psychophysiological stress. Their combined effect leads to the formation of occupational diseases, most often manifested by the musculoskeletal system, cardiovascular and nervous systems.

Hygienic assessment of working conditions makes it possible to identify the main production risks and determine the directions of prevention. A set of organizational, sanitary, hygienic, individual and medical measures is the basis for maintaining the health of cardiac surgeons and improving their professional performance.

Thus, optimization of working conditions and systemic prevention of occupational pathology are of key importance for ensuring the safety and effectiveness of cardiac surgeons.

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