

Hygiene and safety of labour in medical care institutions.

Treatment establishments (hospitals) is build for creation treatment-guarding mode

The treatment-guarding mode and it main components.

The treatment-guarding mode is the complex of treatment -diagnostic, hygienic, administrative and economic actions, directed on he fastest restoration of work capacity or health of the person.

Treatment-diagnostic actions:

- Diagnostic and medical procedures. They are the main factor, but without performance other measures of treatment-guarding mode their efficiency is reduced.

Hygienic actions:

- Optimum choice site of hospital, observance requirements to hospital site and its functional zones,

- Creation sanitary-antyeidemic mode in hospitals, prevention intra hospital infections (II),

- Creation optimum hygienic conditions of accommodation, lay-out, solation and functional connection premises in hospital,

- Maintenance hygienic requirements to microclimate, bacterial impurity of the hospital environment, illumination, ventilation, water supply, heating of hospital premises,

- Maintenance rational and dietetic feeding patients, prevention food poisonings,

- Observance personal hygiene by patients and the personnel,

- Creation optimum working conditions for medical staff and prevention occupational diseases in personnel.

Administrative actions:

- Establishment the schedule and mode of operation of hospital and polyclinic,

- Management states of the personnel,

- Analysis effectiveness work of the personnel etc.

Economic actions:

Supply with medicines, linen and the equipment, foodstuffs transport supply of hospital.

HYGIENIC REQUIREMENTS for the HOSPITAL SITE

At choice place for site of hospital of the common structure (central region hospital city hospital with polyclinic etc) 2 basic requirements are showed:

1) Creation optimum hygienic conditions in the place of location - is better behind city.

2) Availability to the served population (radius service of polyclinic in city 3-5 kms) - hospital must be in city center where it is bad hygienic conditions.

It is difficult enough to combine both these requirements since they are inconsistent. Now the problem is solved by construction hospital on suburb, and polyclinics - in city center.

For the specialized hospitals (phtysiatic, oncological, psycho-neurologic, infectious, venerologic) the first requirement is priority, second is not need.

The important criterion of hospital site is its area.

The sizes of the ground areas for hospitals of all types are regulated Sanitary norms and depend on capacity of hospital at capacity hospital up to 50 cots - 300 m² for 1 cot, up to 100 cots - 200 m², from 200 up to 400 cots - 140-100 m², from 400 up to 800 cots - 100 - 80 m², from 800 up to 1000 cots - 80 - 60 m².

For the specialized hospitals in suburb the area is increased for infectious and oncological hospitals on 15 %, for phtysiatic and psychiatric - on 25 %, for pediatric on 40 % The area site of maternity hospital makes 0,7 from norms for usual hospital.

HYGIENIC REQUIREMENTS FOR THE LAYOUT of the HOSPITAL SITE.

The hospital site should be the rectangular form with a ratio of the sides as 1:2 or 3:4 for convenience functional zones.

The density building of site of hospital should not exceed 15 %. Green plantings should occupy not less than 60 % of the area of a site. On perimeter the protective green strip not less than 15 meters is arranged.

Functional zones on hospital site:

1 Zone medical buildings (infectious and not infectious). Infectious branch place in depth of a site.

2 The landscape gardening zone - includes green plantings on perimeter of a site, between buildings.

3 The zone pathological anatomical branch should settle down outside of their visibility from windows of medical cases.

4 Zone polyclinic. The polyclinic should be placed on distance 30-50 m from medical cases and have a separate entrance on a hospital site, or to be closer to a main entrance on a hospital site.

5 The economic zone settles on distance 30-40 meters from other zones. Here place the central boiler-house, laundry with disinfection chamber, warehouse premises, garage, kitchen.

THE SYSTEMS OF HOSPITAL CONSTRUCTION.

Historical types construction hospitals:

In 17-18 centuries - barracks type (one big room for all patients), then - corridor-barracks type - the big wards left in a corridor - conditions for patients and the personnel were a little improved.

The hutment type. For the first time in the world was applied by N.I. Pirogov in Crimea in 1855-1856. Patients after operations were short time in one wooden barrack, then they translated in other barrack, and old barrack burnt. It made possible to lower amount of postoperative infectious complications.

Pavilion type - in 19 century - the beginning 20 century. It is construction separate premises for wards in park with good airing, illumination.

Modern types construction hospitals (in 20 century):

1 Decentralized system is characterized by presence several usually one - two floor buildings, each of which is used for branch of one type (surgical, therapeutic etc). In separate buildings of hospital placed diagnostic economic and auxiliary services, management of hospital, polyclinic.

This system is now applied at construction sanatorium establishments and for building hospitals in mountain districts.

2 The centralized system is characterized accommodation all medical branches, polyclinics, administrative premises, pathological anatomical and economic branches in one multi-storey building. For example, for 900-cots hospital needs 15-floor building.

3 The mixed system building is characterized by the tendency to reduction amount of medical cases up to 2-4, centralization hospital treatment-diagnostic and auxiliary services. Infectious, children's, radiological branches and polyclinic are placed in separate buildings.

4 The centralized-block system in modern conditions is the most appropriate for large hospitals. Basic sign of centralized-block system is division all premises of hospital complex into two groups:

1) The first group of premises - for long-term, stable operation-treatment buildings with ward sections of any structure.

2) The second group of premises which functional purpose demands regular updating of the equipment, reconstruction (which realization should not stop work of hospital complex as a

whole) - operational block, premises for functional diagnostics, diagnostic laboratories, physiotherapeutic branches, polyclinic, etc.

HYGIENIC REQUIREMENTS FOR WARD SECTION.

The basic functional element of any branch of hospital is ward section for 25 - 30 cots in some profile branches (reanimation branch). It is less. If branch is calculated for 30 cots it is equal one ward section.

The basic premises of ward section wards room of the doctor viewing buffet, bathroom hall - dining room material. There should be two 1-cot wards (for infectious patients - isolator and for agonise patients).

HYGIENIC REQUIREMENTS TO HOSPITAL WARD.

Capacity of ward for adults and children is more senior than 1 year in hospitals should not be more than 4 cots. This parameter is optimum both in technological and in hygienic relations. The area of ward should be 7 m² on 1 cot the area in ward of intensive therapy - 13 m² on 1 cot. The microclimate temperature 18-22⁰ C, relative humidity 40-60 %, speed movement of air 0,2-0,4 m/s. Ventilation contents CO₂ - 0,1 %, frequency rate of ventilation 2-3 volume of ventilation 20-80 m³ in hour at 1 cot. Natural illumination: Light factor (LF) 1:5-1:6, factor natural illumination (FNI) - 1 %. Artificial illumination: common illumination in ward not less than 50 lux, local -100 lux, on duty (at night at an exit) - 3 lux. The distance between beds not less than 0 8 - 1 m and between beds and external walls is not closer than 0 9 - 1 m. Maximum permissible level of noise in ward - 25 deciBell.

HYGIENIC REQUIREMENTS TO OPERATIONAL BLOCK.

At designing modern large hospitals rationally association several operational in a uniform complex, which should have two branches septic and aseptic with operational, auxiliary and office accommodations.

The structure operational block enter: operational, predoperative, sterilizing, narcotic, premises for storage blood and the portable equipment, a premise for surgeons and operational sisters.

Operational block shares on 4 zones on a degree of sterility:

- 1) Sterile (operational);
- 2) Strictly mode (sanitary processing for the personnel, sterilizing);
- 3) The limited mode (washing, rooms for the personnel);
- 4) Common hospital mode (cabinet chief of block, etc).

HYGIENIC REQUIREMENTS TO THE OPERATIONAL

Operational is designing on 1 operational table. The area operational should be not less 36 m², for difficult operations with participation the big operational brigade - 45-50 m² Common amount operational tables accept at the rate of 1 table on everyone 30 cots in branches of a surgical structure. Walls operational should be good washing, their coloring in greenish tone is preferable.

Natural illumination. Light factor – 1:2-1:4, factor natural illumination - 2-2,5 % General artificial light exposure - 300-500 lux, local - (on operational field) - 3-10 thousand lux.

Ventilation. Operational air ventilation inflow 6-multiple, extract - 5 with creation surplus of air so that microbes in air from other premises of operational block can not enter in operational. A ventilating aperture must be inflow - at a ceiling, exhaust - at a floor as pair of narcotics it is heavier than air.

Temperature of air in operational 22-25⁰C (the patient is in a narcosis - the centers thermoregulation are switched - off), humidity up to 55 % (the prevention explosion pairs narcotics in view of high electric conductivity damp air), speed movement of air - 0,1 m/sec.

HYGIENIC REQUIREMENTS to the RECEPTION BRANCH.

The reception is intended for registration physical examination, statement or specification of the diagnosis sanitary processing patients and in case of need - rendering emergency medical aid. At reception wards patients with the obscure diagnosis are placed.

The structure of reception includes the following premises lobby (for expectation), registry and help, viewing, sanitary processing (locker room, a bath, for dressing), procedural, laboratory for urgent analyses, roentgen cabinet, wards on 1-2 cot, study of the doctor on duty, toilet for the personnel.

HYGIENIC REQUIREMENTS to INFECTIOUS BRANCH

Infectious patients act in the infectious branches not only for treatment, but also for isolation. Therefore, internal planning and sanitary mode of this branch makes for the purpose prevention intra hospital infections.

Isolation patients are carried out in boxings, half-boxings and boxing wards.

Boxing - a premise the general area 22 m^2 (on 1 cot) or 27 m^2 (on 2 cots) in which there is a ward, external entrance and tambour for receipt the patient, bathroom, internal entrance, which is connected to a hospital corridor. In boxing place patients with the obscure diagnosis and particularly danderous infections (cholera, ets).

Half-boxing - differs from boxing only absence external entrance with tambour. Patients act in it through a hospital corridor.

Boxing wards - usual ward, cots in which are divided by partitions into height 2 - 2.5 m for the prevention contact between infectious patients. It is impossible to place here patients with air - drop infections - the general air exchange in this ward.

The Infectious branch should have two entrances: one for patients, the second - for the personnel, for delivery medicines, food etc.

Sewage from infectious branch before dump in the city water drain are disinfected (norm of residual chlorine in them - 3 mg /l).

Admission department. Each hospital should have admission department. Functions of admission department are reception, registration, medical examination and sanitary treatment of patients. The design of this department should prevent possibility of outbreak of hospital infections and stimulate improvement of medical diagnostic process. The admission department of hospitals of centralized and mixed system of construction should be situated in main hospital building whereas in decentralized hospitals - in the building with the greatest number of beds. While planning of admission department principle of constant circulation of entering and discharging patients must be kept. The structure of admission department includes the following rooms: a hall (waiting room) with a registry and cloak-room; an inquiry office at the rate of 1.2 m^2 for one entering patient; a room for examining patients (sanitary examination or sick inspection room), its area should be 12 m^2 ; a sanitary treatment room with a cloak-room; a bath-room and a shower for patients; a manipulation room with a dressing room; a room for doctor-in-charge (if a hospital has 300 beds and more): a box (diagnostic ward) for patients with unknown diagnosis; toilets for personnel and patients.

Surgical department. Functions of this department are reception of patients, specification of diagnosis and surgical help for patients. The main peculiarity of surgical department, is the presence of the operating block. For creation of aseptic conditions during the operation in operating block should be 3 zones: sterile zone, especially clean zone and clean zone. In the first zone there are to which strict aseptic requirements are specified. The sterile zone includes operating room and room for sterilization of surgical materials and instruments. The second zone is called especially clean zone. It includes preoperating room and room for narcosis. These rooms are connected directly with operating room. In the third zone there must be room for

preparation and keeping blood, room for portable equipment, rooms for surgeons and nurses, laboratory for urgent analyses, a protocol room and clean zone for sanitary test of the personnel.

The area of the operating room for general operations must be 36 m^2 , for orthopedic, traumatologic and neurosurgery operations it is 42 m^2 , for heart and vessels operations operating room must be 48 m^2 .

The area of the preoperating room should be 15 m^2 , if there is one operating room; if there are two operating rooms, the preoperating room must be 25 m^2 . Besides, there must be a dressing room with the area of 22 m^2 . The operating room must face the North or North-East. In the preoperating room, operating room and resuscitation (reanimation) room walls must be covered with glaze-tiles at the whole height of the room. The intense visual work of the surgeon and the personnel in the operating room requires special conditions of natural and artificial light. The light coefficient in operating room must be $1/3 - 1/4$, coefficient of natural illumination must be 2%. The level of artificial lighting on the operating field and in the depth of a wound should be 3000-1000 lx. The spectrum of artificial lighting should be about the spectrum of day light. There must be no shadows on the operating table and in the depth of a wound. There must be no direct and reflected brilliance within sight. The lamps should not radiate intensive thermal radiation, heating up the head of the surgeon and a wound. Temperature of air in the zone-located at height of 50-70 cm from an operating field must not exceed on $2-3^\circ\text{C}$ the temperature of air in the operating room. In operating rooms, rooms for narcosis it is recommended to provide air-conditioning purified with bacterium filters. While air-conditioning should provide domination of air inflow speed over outflow. The ratio of air movement should be 2-3 times per hour, during narcosis ratio of air movement must be 10 times per hour. The temperature in the operating room must be $22-25^\circ\text{C}$. The relative humidity of air should be up to 60%.

Therapeutic department. The main functions of the therapeutic department are reception of therapeutic patients, establishing diagnosis and providing conservative treatment. The therapeutic department consists of wards for patients, an office for head of department, a room for interns, a medical post (more often 2), a manipulation room, a functional diagnostic room, an X-ray room (one X-ray room for 100 beds), a physiotherapy room for electric phores, electric sleep, and so on, a laboratory for clinical diagnostic researches, a public catering organization, a toilet, and other subsidiary rooms. While designing the department everything should be provided for medical process. The supply of oxygen and other medical gases to the patient's bed, a current, water and an opportunity of accommodation the necessary equipment at the bed, communication with the center of supervision of the patients are created.

Infectious department. The functions of infectious department are reception of the infectious patients, specified diagnosis, isolation of patients, and medical treatment of them. Peculiarities of the infectious department design are localization of the infectious department in a separate building, the design of small infectious department should permit dividing it into several independent sections intended for health service of patients with various infections. For improvement of isolation of patients sections are designed for one and two beds, maximum four beds in ward, all wards are equipped with a washstand and a tap. In children's infectious departments for prevention an air-borne (droplet) infections, isolation wards as boxes and semi-boxes are designed. In these wards it is possible to place patients with a certain infection.

Isolation wards are designed for one or two beds, 22 m^2 and 27 m^2 accordingly. In the infectious department the following rooms are planned: a buffet (14 m^2) with two rooms (a kitchen and a dining-room) with everything required for washing and boiling dishes, a sanitary inspection room with a shower for the staff, a toilet for the medical staff, a toilet for the

patients, a doctor's office (10m^2), a treatment room, a room for the matron inventory, a sanitary room (6m^2) for dirty linen, things for cleaning and washing of medical dishes.

Maternity department. The functions of maternity department are reception of women to bear a child, their examination, consultation, maintenance and control over the child birth and care of newborn children. Peculiarities of the design of the maternity department include the following: maternity department is located in separate building. The following rooms must be planned in the maternity department: the filter room, sanitary treatment rooms, pre-maternity wards, maternity block, wards of intensive therapy, post natal wards, wards for new born children, medical diagnostic and subsidiary rooms. The filter room is for reception and examination of women. In this room it is necessary to carry out measure of body temperature, examination of skin and mucous membranes, and so on. There are two sanitary treatment rooms. The first sanitary treatment room for women with physiological pregnancy and women with pathology of pregnancy. In the maternity department there should be 25-30% of beds for women with pathology of pregnancy. The second sanitary treatment room is for women with doubtful observation conditions. Physiological and doubtful departments have the same interior design. In the maternity room a special place is designed for toilet of newborns. It has swaddling tables, table for measuring and weighing of newborn child. It is more convenient to make newborn's toilet in separate room between two maternity wards. Nowadays in our country wards for one or two women with their children are used. This experience is successful.

Physiological and suspicious departments must be isolated and have separate entrances. There must be an operating room in each department. The area of operating room is $20\text{-}30\text{m}^2$, it depends on the number of beds in the department. All things for women must be individual. After discharge of women from the department purification, wards disinfection is carried out with chloride of lime and irradiation of air by ultra-violet lamps during 1.5-2 hours. The number of microbes in the air must be 500 microbes in 1m^3 before the beginning of work and not more than 1000 microbes in 1m^3 after the work.

The gynecological department. Peculiarities of the design of gynecological department are arranged as surgical ones. It has in its structure a reception section, wards for patients, an operating room, a dressing room and other medical-diagnostic and subsidiary rooms. A gynecological department should be completely isolated from the maternity one and have a separate entrance.

The tubercular department. The functions of this department are reception of patients, who were affected by Koch's bacillus, their isolation and their medical treatment. Tuberculosis is a chronic disease, requiring a long-duration treatment (an average 12-18 months). The design of the department should take into account this peculiarity. It is advisable to place tubercular department blocks of buildings in the park zone or out of the city, in mountains there are tubercular hospitals of a sanatorium type. The tubercular department of the hospital can be planned in an independent building. In the building the department is arranged on specialties of pulmonary tuberculosis for adults, pulmonary tuberculosis for children, pulmonary surgical tuberculosis, tuberculosis of bones. The reception of the adults and children is carried out in separate rooms. At the children's reception room there are quarantine beds, placed in one-bed wards. The compulsory element of the tubercular department is an open not glazed, verandah, where patients can stay outdoors. Additional room of the tubercular department is the room for artificial pneumothorax.

Hospital infections and their prophylaxis

Hospital infections are the set of infectious diseases acquired by patients during their examination or treatment in hospitals. Hospital infections have unfavorable effect on the

organism of patients. Under influence of hospital infections the general condition of patients become worse, exhaustion of immune mechanisms of the organism and disturbing of metabolism occur. Terms of treatment of disease going up 2-3 times; additional expenses increase for treatment of patients becomes necessary, mortality of patients goes up. Among the hospital infections the first place belongs to the diseases of upper respiratory organs and children's infections, namely influenza, measles, chicken pox, scarlet fever, infectious paratitits, quinsy. The second place belongs to staphylococcal and streptococcal infections of the skin, hypodermic cellular tissue, mucous membranes, post-operative suppurative inflammatory complications and septic diseases. The third place obtain intestinal infections, i.e. dysentery, salmonellosis. Sources of hospital infections are patients, who get into hospital in the incubation period of infectious diseases, patients brought to hospital with mixed infection, patients, who have not finished terms of quarantine (somatic patients, who did not complete the course of quarantine), carriers of pathogenic staphylococcus, streptococcus, intestinal infections, poliomyelitis are among patients and medical staff, visitors of hospitals carriers of the microbes or visitors with easy forms of infectious diseases. Reasons for growth of hospital infections are change of the environment inhabitation and microorganism properties, introduction in practice more and more complex surgical interventions, increase of the number of hospitalized children of early age and old-aged patients, non-observance of rational antibiotic therapy rules, non-observance of aseptic and antiseptic rules, non-observance of sanitary hygienic conditions in the hospital.

Difficulties in prevention of hospital infections are connected with wide circulation of activators inside the hospital, variety of ways of spread (air-borne, dust and contact), high stability of activators to unfavorable factors of external environment, high susceptibility of the weakened organism of patients to infections, absence of effective methods of specific prophylaxis.

THE REASONS AND PROPHYLACTIC INTRA -HOSPITAL INFECTIONS. HYGIENE OF WORK MEDICAL PERSONNEL.

Intra hospital infection (II) by definition the WHO it is any clinically expressed disease microbe aetiology, amazing the patient during hospitalization or visiting medical establishments, and also medical staff during his professional work, irrespective, are shown or are not shown symptoms of this disease during presence of the given persons in medical establishment.

Structure activators II in 20 century:

1) Till 50th years the leading position in structure II was occupied with the sharp infectious diseases caused by pathogenic microorganisms (scarlet fever, diphtheria, chicken pox, gas gangrene, tetanus etc).

2) Original "plague" of many hospitals in 50-60-e years became a staphylococcal infection.

3) Since 70th years at first place become the gram-negative flora - proteus, escherichia, enterobacter, etc (are very stable to antibiotics).

Danger II for the patient:

- Current of the basic disease is made heavier;
- Morbidity patients at generalized form II is up to 60 %;
- There can be new illnesses during treatment in hospital.

Danger II for public health services and the state:

- Violation work of a hospital, down to time closing for disinfection;
- Increase time of stay of the patient in a hospital (on the average one case II extends term of stay of the patient in hospital for 13-17 days);

- Additional economic charges for treatment patients, work of the personnel.

Basic sources II:

- Initial patients, medical staff, visitors (less often);
- Secondary (objects of the intra hospital environment): tools, linen, furniture; air, food.

Categories intra hospital subjects on danger of transfer II:

- 1) Critical (are most dangerous, the most strict requirements to disinfection) - surgical toolkit needles, endoscopes, cateters;
- 2) half-critical (the equipment for inhalations and anesthesia, utensils);
- 3) Noncritical (linen, furniture).

The Basic ways of transfer II.

Aerosol (air - drop and air - dust);

- Contact (through tools, linen furniture);
- Injection (at introduction of medicines);
- Fecal-oral (dirty hands);
- Alimentary (through food).

Structure II:

- Infections renal ways - 15-40 %;
- Surgical infection -10-30 %;
- Infections of respiratory ways -15-20 %;
- Intestinal infections -10-20 %.

The Reasons growing II now in any countries:

- Growth among hospitalized persons from groups of the increased risk - patients with various chronic diseases (cardiovascular, oncological illnesses of blood, a diabetes), immunodepressive conditions; old patients;
- Easing natural immunity and allergization the population owing to an adverse ecological situation;
- "Urbanization" of the intra hospital environment; concentration a plenty of patients and the personnel in multi-storey buildings;
- Complication operative interventions increase their duration and traumatic, wide application endoscope equipment which are badly giving in to sterilization;
- Excessive, sometimes insufficiently proved application antibiotics, formation intra hospital kinds activators II, polyresistant to antibiotics, used in a hospital;
- Insufficiently careful disinfecting injection and other toolkit;
- Increase duration stay of the patient in a hospital, connected to many functional - diagnostic researches;
- Easing attention to strict observance hygienic and sanitary - antyepidemical modes in hospitals.

System prevention II in hospital:

- 1) Strict observance sanitary - antyepidemical mode:

- Good ventilation, sanitation air of premises, optimum microclimate;
- Realization medical control personnel;
- Qualitative disinfection and sterilization the equipment, linen etc.;
- Regular bacteriological control tools, linen, air, food, hands;
- Revealing and isolation infectious patients;
- Observance rules of personal hygiene by the personnel and patients.

- 2) Architectural actions:

- Rational accommodation and zoning hospital site;
- Interposition branches and divisions on buildings and floors for isolation ward sections,

branches, operational, studies, wards;

- Observance hygienic norms of the area, volume of hospital premises.

3) Increase resistancy patients and the personnel optimum mode of work and rest, rational balanced diet; Sufficient stay on fresh air; Scheduled and emergency immunization.

Prophylaxis of hospital infections is achieved by specific and nonspecific measures. Nonspecific prophylaxis includes a complex of architectural planning, sanitary and technical, sanitary and antiepidemic, disinfection and sterilization measures. It is-carried out by the following ways: firstly, planning measures, which are directed to prevention of spreading infectious activators in medical complex. For these purpose it is necessary to create rational accommodation of departments, isolation of wards from the operating block, anesthesiological department, medical diagnostic department, and others. Sanitary-technical measures are ventilation of hospital rooms and air-conditioning of hospital premises. Sanitary and antiepidemic measures include sanitary-hygienic, sanitary-antiepidemic regimen in department. It is very important for prophylaxis of hospital infections to provide sanitary culture of personnel and patients. Bacteriological control in department, relieving among the staff and patients bacterial carriers of infectious diseases is also regarded as prophylactic measures. Disinfection and sterilization measures are directed to destruction of activators of infections on things and instruments by physical and chemical methods.

Specific prophylaxis is a complex of measures, directed to the increase of stability of the patient's organism to hospital infections. Specific prophylaxis includes planned specific prophylaxis and urgent specific prophylaxis. Planned specific prophylaxis is planned active immunization of pregnant women with purified staphylococcal anatoxin. Urgent specific prophylaxis provides measures, which are directed to prevention of development of diseases of people infected by infectious activators. Cleanliness of air in hospital rooms is estimated by the general number of microbes and number of hemolytic streptococci in 1 m³.

HYGIENE of WORK MEDICAL PERSONNEL.

Between other professions, sick rate of medical personnel is rather high, especially in surgeons, anesthesiologists, infectionists, phtysiatrists (doctors, treat for tuberculosis), roentgenologists, radiologists, etc.

HYGIENE of WORK SURGEONS and ANESTHESIOLOGISTS.

During professional work surgeons and anesthesiologists have a number of harmful factors.

- Action chemical substances (means for a narcosis),
- Adverse microclimate (hot),
- Increase concentration CO₂ and decrease contents O₂ (sterile mask on the face),
- Psycho-emotional and physical overloads with a long pressure on visual acoustical tactile analyzers,
- Compelled position of a body (long stay in vertical position),
- Contact to infectious agents (includes AIDS),
- Often violations of a mode of work and rest.

For prevention professional pathology will carry out a number of preventive actions:

- Creation good artificial microclimate (air-conditioning);
- Centralized submission O₂ in operational;
- Forced-air and exhaust ventilation with prevalence of inflow;
- Observance mode of work and rest (duration of a working day in operational day no more than 5 hours, alternation of one operational and two not operational days, after realization of operation - gymnastic exercises and reception soul),
- High-grade feed;

- After realization operation it is not recommended to carry out outpatient reception hours;
- Maintenance surgeons and anesthesiologists dressing from the materials providing good ventilation;
- Change dressing after four hours, mask - in 2 hours after the beginning of operation (since through this time interval sterility is lost).