

**MINISTRY OF HEALTH OF UKRAINE**  
**POLTAVA STATE MEDICAL UNIVERSITY**

Department general surgery

**METHODICAL INSTRUCTIONS**  
**FOR STUDENT SELF-DIRECTED WORK**  
**WHEN PREPARING FOR AND DURING TO THE PRACTICAL CLASS**

<b>Study discipline</b>	<b>General surgery</b>
<b>Module №1</b>	<b>INTRODUCTION TO SURGERY. SURGICAL EMERGENCY CONDITIONS. FUNDAMENTALS OF ANESTHESIOLOGY AND INTENSIVE CARE</b>
<b>Content module 1.</b>	Introductions in surgery. Bandages. Asepsis and antisepsis. Peculiarities of care of surgical patients
<b>Lesson theme №4</b>	Hospital infection. Sanitary-epidemiological regime. Asepsis.
<b>Years of study</b>	<b><i>III</i></b>
<b>Faculty</b>	<b>International</b>

Poltava

<b>Content module 1.</b>	Introductions in surgery. Bandages. Asepsis and antisepsis. Peculiarities of care of surgical patients
<b>Lesson theme №4</b>	Hospital infection. Sanitary-epidemiological regime. Asepsis.

### 1. Actuality of the theme:

Among the complications in surgery are most common infectious. They can lead to death, despite the brilliantly performed surgery. Prevention of such complications - the main principle of surgery, which is based on aseptic and antiseptic. To prevent contact of wound infection is necessary to achieve sterility of all that will be faced with an injury. This is achieved by the operating sterilization whiteness bandaging and stiches, gloves, tools, hand surgery and treatment of the surgical field. Sterilization of suture material is aimed at preventing a contact and implantation of wound infection.

Knowledge of the basic principles of sterilization is essential for surgeons of different specialties.

### 2. Educational aims:

- Characteristics of the concept of sanitary-hygienic and antiepidemic regimes in the surgical departments.
- Hygiene requirements for nursing clothes.
- Hygienic requirements for the clothing of patients.
- Hygienic requirements for bedding patients.
- Hygienic requirements for a change of clothes, in the care of the sick and seriously ill patients.
- The principles of making diagnosis of in-hospital infection, prevention of its spread.
- Understand the structure and organization of work in the sterilization.
- Know the classification of surgical instruments.
- Be able to prepare for the sterilization of surgical instruments.
- Be able to conduct tests that monitor the quality of cleaning before sterilization of surgical instruments.
- Be able to sterilize cutting, optical, general surgical instruments.
- Know the classification of the suture, and the requirements for it.
- To be able to sterilize stitch materials.

### 3. Basic knowledge, skills necessary for studying the topic (inter-disciplinary integration)

The names of the preceding disciplines	Acquired skills
Biological and bioorganic chemistry	To be able to assess the concentration of disinfectant solutions. Know the principles of chemical disinfectants and tests for sterility and hidden blood

Microbiology	Know the characteristics and conditions of the existence of spore forms of microorganisms and the mechanism of action of different types of disinfectants on microorganisms.
Biophysics	Know the types and principles of physical methods of sterilization
Normal anatomy	conduct an anthropometric study of the patient, a preliminary diagnosis
Propedeutics Internal Medicine	Inspect patients, palpation, percussion, auscultation
Pathophysiology	To be able to assess the patient's general condition

**The student must have an idea:**

- about the principles of chemical disinfectants, sterility testing, hidden blood, protein compounds, residue of detergent
- the features and conditions of the existence of spore forms of microorganisms and the mechanism of action of different types of disinfectants on microorganisms
- about the principles of physical methods of sterilization
- about the features of the influence of different sterilization methods for cutting, optical and general surgical instruments
- the qualities of natural and synthetic stitch material

**The student should know:**

- Conduct a wet cleaning in the surgical department with the use of antiseptics.
- Conduct a replacement underwear for patients with common and bed rest.
- Conduct a change of bed linen and patients with a total bed rest.
- Rules of preparation of the instruments for sterilization
- methodology of preparation of cleaners and disinfectants
- methodology for conducting tests on the quality of before-sterilization processing tools
- sterilization methods of cutting, optical and general surgical instruments
- the types of stitch materials and methods of sterilization

**The student should be able to:**

- prepare instruments for sterilization
- prepare cleaning and disinfecting solutions
- to test the quality of the instruments before - sterilization treatment
- sterilize cutting, optical and general surgical instruments
- sterilized suture

**The mastery of the practical skills by students:**

- the preparation of tools for sterilization
- preparation of detergents and disinfectants

- conducting tests on the quality of before-sterilization processing tools
- conducting sterilization cutting, optical and general surgical instruments
- carrying out sterilization stitch material
- Wet cleaning in the surgical department with the use of antiseptics.
- Replacement of underwear and patients with a total bed rest.
- Bed linen and patients with a total bed rest.
- Thermometry.
- Subcutaneous injection.
- Intramuscular injections.
- Intravenous injections.

### 1. Task for self-study in preparation for the lesson.

#### 4.1. The list of basic terms, parameters, characteristics, which the student must learn in preparation for the class:

Term	Definition
Azopiram	A chemical that is used to detect traces of blood
Phenolphthaleinum	A chemical that is used to detect traces of blood
Kraft – paper	Heat-resistant paper
Bix	Metallic device for storage and sterilization of medical products therein
Autoclave	Device for sterilizing a pair of pressure
Drying cabinet	Device for dry-heat sterilization
Medical aid	Range of diagnostic and therapeutic measures aimed at making the diagnosis, elimination or reduction of symptoms and signs of the disease or condition about which the patient is asked to normalize his life, improvement or restoration of health
Surgical care	Diseases that require surgical treatment with surgery.
Surgery	A branch of medicine that studies the diseases and injuries of all parts and organs of the human body, and develops and applies special treatment.
Hygiene of the surgical hospitals	Section of Hygiene, which is developing a hygienic standards and requirements for the location, planning, sanitary improvement of surgical hospital.
Medical deontology	The science that studies the specific medical ethics, rules and norms of interaction with colleagues physician and patient

#### 4.2 Theoretical questions for the class:

1. Main stages of surgery.
2. What domestic surgical school you know?;
3. How to organize surgical care in Ukraine?
4. What rules of behavior in the surgical clinic do you know?
5. The concept of surgical deontology.
6. The structure of the surgical clinic.

7. The concept of hygiene in the surgical hospital in order to prevent the spread of nosocomial infections.
8. What are the basic principles of body hygiene, clothing, medical staff, laundry hygiene and clothing of patients do you know?
9. Duties of the guard and a senior nurse.
10. What is the nurse's office?
11. What are the main types of medical records do you know?
12. Thermometry technique.
13. Tech intramuscular injection.
14. Tech subcutaneous injection.
15. Tech intravenous injection
16. The structure and organization of work in the sterilization.
17. Preparing for the sterilization of surgical instruments.
18. Preparing for the sterilization of optical instruments.
19. The samples, which control the quality of the cleaning before sterilization of surgical instruments.
20. Sterilization cutting, optical, general surgical instruments.
21. Classification of stitch material and the requirements for it.
22. Sterilization of stitch material

#### **4.3. Practical activities (tasks) that are used in class:**

1. Wet cleaning in the surgical department with the use of antiseptics.
2. Replacing underwear patients with common and bed rest.
3. Bed linen patients with a total bed rest.
4. Thermometry technique
5. Tech intramuscular injection.
6. Tech subcutaneous injection.
7. Tech intravenous injection
8. Preparing instruments for sterilization.
9. Preparation of detergents and disinfectants.
10. Samples of the quality of the before-sterilization.

#### **4. The content of the topic.**

Hygiene of surgical hospital, tidying up, sanitary-epidemiological state, hygiene of body, clothes of medical staff, linen and clothes of patients.

Maintenance of sanitary-hygienic rules and normative of work of medical establishment is an integral (imprescriptible - неотъемлемая) part in complex medical measure of patient treatment.

**Sanitary-antiepidemiological regiment** is complex organization, sanitary-preventive and anti-epidemiological measures averted (предотвращающих) of infection. This infection may favor (способствовать) development of complications in surgical patients. Purulent-septic complications most often complicate course of postoperative period.

**Hygiene of surgical hospital** is section of general hygiene, which work out hygienic norms and requires to placing, planning, sanitary-technical hospital planning (comfortable). Purpose of sanitary-hygienic and anti-epidemic local regiment of hospital is providing optimal conditions of being patient at clinic, effective treatment, prophylactic and destroy intahospital infection.

Surgical department include wards, dressing rooms, manipulations-room, operational theater. Peculiarity of surgical department in dividing its on two part: clean and purulent. Patients with purulent wounds are located in separate wards or sections, how may more distant from operational theater, separated purulent dressing-room and medical staff attend this patients. If in surgical department one dressing room occurs, patient with clean wound are dressed before patients with purulent wounds.

Operational theater is main medical-diagnostic section of surgical department. All surgical operational are performed in operational theater. With purpose to observe aseptic rules, operational theater must have isolating impenetrable department: I - aseptic, clean and II - septic, purulent. In this department strict zonal division of inside rooms are realized.

All rooms operational block, according degree of antiseptics rules fonctionnaly are divided on **4 zones**: sterile, clean (strict regiment), technical (restrict - ограниченный), dirty zone.

Sanitary-hygienic regiment of surgical hospital direct to eliminate negative factors of hospital environment negative factors of hospital environment on patient and medical staff, to provide for patient full hygienic, somatic and mental comfort, to provide medical staff optimal conditions of work.

Sanitary-hygienic regiment determines:

- to observe norm cubic measure (capacity) of hospital wards;
- to provide optimal microclimate, chemical and bacteriological composition of air environment, regiment of ventilation and illumination of rooms;
- to provide of high (good) quality drinking water;
- to disinfect and full eliminate timely all waste (material) (отходы);
- to provide of patient with rational and balanced diet (nutrition);
- to provide timely cleaning of rooms;
- to provide timely change of body clothes and linen
- to observe of rule of personal hygiene.

Anti-epidemic regiment of surgical department direct on averting (предотвращает) of origin and spreading of intrahospital infections.

**Intrahospital infections** are clinical diseases with microbial origin, which affected (поражают) of 1)patient as result of his hospitalization or his visit of medical establishment; 2) medical staff during realize (carry out) their work.

Intrahospital infections may be hospital and ambulant.

Origins of intrahospital infections are 1) patients with acute or chronic course of infection; 2) medical staff, meanly germ-carrier or illness on effaced (стертые) forms of infection; 3) visitors – illness and healthy germ-carrier and infectious material.

Main ways intahospital infections are aerosol (air-dropped and air-dust ), contact, parenteral, fecal-oral, alimentar, transmissive.

Main factors transmission of infection is hands, other object of environment.

Each collaborator settled on work must be full examined.

Full medical examination include: examination by otolaryngologist, stomatologist; bacteriological test of mucous smear from nasopharynx for reveal pathogenic stafilococcus. Also each collaborator must be instructed about main sanitary-epidemiologic measures.

All medical staff are despanserized for timely reveal and treat of chronic inflammatory diseases of nasopharinx, germ-carrier of pathogenic staphylococcus. Medical staff must be obligatory periodically are examined: yearly examined by therapist, females – gynecologist; dentist; examination for carried typhoid (1 time per year), diphtheria (according epidemiological indications); staphylococcus (1 time per 1 month), tuberculosis (yearly), intestinal infections, helminthosis (for get work and late according epidemiological indications), lues, honorrea, examination by dermatovenerologist.

When intrahospital infection arise, patients extraordinary are examined and extraordinary examination of all medical staff are achieved (carried out) on germ-carrier. Patients with revealed intrahospital infections are isolated in individual separated wards.

Each case of intrahospital infection must be documented.

In Ukraine control for observance of rule anti-epidemic regiment accomplish in consequence of order № 720 (31.07.1978). It introduce obligate bacteriological control of condition of air environment, surfaces, quality of sterilization and disinfection.

**According this orders the rules are next:**

1. Moist cleaning of rooms (washing of floor, rubbing (протираніє) of furniture, equipment) not rare, than 2 time per day with using detergents and disinfectants.
2. Wiping of window pane not rare than 1 time per month.
3. General cleaning of wall wards – 1 time per month with careful washing of walls, floor, equipment, rubbing of furniture.
4. General cleaning surgical theater, dressing-rooms are accomplished not rare than 1 time per week.
5. Rooms with singular special regiment of sterility after cleaning are irradiated with bacterial lamp (light) (1 Vt x 1m<sup>2</sup> rooms)

In operational theater rule of “red line” is used: All, who come in operational theater must be dress in sterile clothes and shoe covers (бахилы). Medical staff, which don't take part in surgical operation, to come in operational black to interdict (prohibit, forbid).

Hygiene of medical staff include 3 main elements: personal hygiene of medical staff, hygiene professional clothes and worked place; hygiene of fulfillment of medical manipulations.

***Hygiene of the Surgical Hospitals*** - hygiene section, which develops hygiene standards and requirements for the location, planning, sanitary improvement. Sanitary-hygienic and anti mode of hospitals established to ensure optimal conditions of stay of patients in hospital, the effective conduct of therapeutic measures to ensure favorable conditions of medical personnel, prevention and neutralization of nosocomial infection.

Patients in the surgical facilities are divided into "pure" and "septic", in connection with which distinguish pure and contaminated surgery.

Clean surgery treats patients without purulent and inflammatory diseases. Contaminated surgery provides care to patients in whom the cause of the disease is an infection. Given the possibility of transferring infection from "septic" patients to "pure" patients with purulent diseases segregated in special wards or purulent surgery.

Surgical department consists of wards for patients, operating unit, dressings, manipulation office and ancillary facilities (a toilet, bathroom, dining room, pantry, laundry room, staff, etc.).

Hygienic regime provides compliance spaciousness of hospital wards, ensuring optimum climate, chemical and bacteriological composition of air, ventilation mode and lighting facilities, supply of safe drinking water, timely and complete removal and decontamination of waste, providing patients with a rational and balanced meals, cleaning, laundry and linen replacement, personal hygiene, etc.

Anti-epidemic conditions of the surgical department aims to prevent the occurrence and spread of nosocomial infections. The main provisions of anti-epidemic regime governed by the Order № 720 (31.07.1978).

Every employee who takes a job, runs a complete physical examination, a short review of the carrying out basic sanitary and anti-epidemic measures. In identifying open inflammation or signs of sickness staff excluded from work until they are cured, the detection of bacteria - organize sanitation. In case of hospital-acquired infections spend an extraordinary medical examination of all staff offices and bacteriological tests on the carrier. Patients diagnosed with nosocomial infection isolated in separate wards and release them to a separate staff and home care.

Monitoring of compliance with anti-epidemic regime in medical institutions is carried out in accordance with the orders of the Ministry of Health number 720, which provides for mandatory bacteriological control of air condition, surfaces, the quality of sterilization and disinfection.

### **The measures to prevent an infection from entering a wound are referred to as ASEPSIS**

#### **ASEPSIS**

A surgical hospital contains the main functional blocks which are as follows: a surgical block, surgery departments, plaster and treatment rooms and dressing-rooms.

An operating unit houses special rooms for operating on patients. It has to be isolated from surgery departments on a separate floor or detachment of the building and be connected with the them by a corridor.

To provide the regimen of sterility, there are the four special functional zones in the surgical block:

1. **The sterile zone**, i.e. the operating theatre (to operate on patients), scrub-up room (for preoperative cleansing surgeons' hands and arms) and the room for sterilisation (to sterilise the instruments to be used during the operation).



2. **The clean zone**, i.e. the rooms for personal hygiene and changing clothes of the staff.

3. **The technical zone**, i.e. the rooms where apparatus for air-conditioning or oxygen supplying and vacuum devices are stored.

4. **The dirty zone**, i.e. the sister's room, the room of the head of surgery and the one for dirty clothes etc.

The operating theatres equipped for using laminated sterile conditioned air are needed for the following types of operation: tissue grafting with subsequent application of immune suppressors, implantation of prosthetics, operations for burns.

Setting of a special isolator box with laminated air flow is possible in the operation rooms built long ago.

The compounds that have antibacterial effects fall into two main groups - chemotherapeutic agents (see «Antiseptics») and chemical agents for disinfection and sterilisation.

The compounds for disinfection and sterilization are used to prevent microbes from entering the wound, i.e. to affect their transmission. Several chemical antibacterial agents can be applied as both a chemotherapeutic agents and those for disinfection and sterilisation (e.g. chlorhexidine, hydrogen peroxide).

Among the chemical agents for disinfection and sterilization commonly used in surgical practice are as follows:

Trade name	Formulation	Indications	Notes
<b>Iodine</b>	1—5% alcohol solutions of iodine	Cleaning the skin around the wound, cleansing superficial wounds and bruises, and the operative field.	Lugole's solution is used for the sterilisation of catgut.
<b>Iodinate</b>	Iodine plus sulphate; contains about 4,5% free iodine	Cleaning the operative site	Before use it has to be dissolved in distilled water in the ratio of 1:4,5
<b>Povidon - iodine</b>	A combination of iodine (0,1—1%) and polivinylpirrolidon	Scrubbing the hands and cleaning the operative site.	
<b>Chloramine B</b>	1—3% solutions	Disinfecting the hands, items used for patient care, non-metallic instruments, rooms	
<b>Formic acid</b>		Cleaning hands before operations, washing surgical instruments and gloves.	Special solutions of the formic acid are prepared e.g. in combination with hydrogen peroxide (pervomur)
<b>Mercury dichloride</b>	Mercury dichloride 1:1000	Disinfecting rubber gloves, patient care items	This solution is seldom used (mainly in the outpatient set-up) due to its toxicity
<b>Ethyl alcohol</b>	70% and 96% solutions.	Disinfecting hands, operative site, and optical instruments, suturing material.	
<b>Formaldehyde</b>	Formaldehyde (36,5-37,5%)	Disinfecting gloves, instruments catheters drainage systems (2—5% solution)	

Triple solution	Formaldehyde — 20 g, carbolic acid or phenol —10 g, sodium carbonate — 30 g, distilled water — up to 1000 ml.	Disinfecting gloves, instruments and drainage systems	A very effective disinfectant
Carbolic acid	Phenol (3-5% solution)	Disinfecting items of patient care	
Roccal (Roccal)	1% or 10% alkyl diethyl benzyl ammonia chloride	Sterilising instruments (1: 1000; exposition period 30 minutes), gloves, drainages (1:4000; exposition period — 24 hours)	To prevent the instruments from corrosion sodium carbonate is added to the "working*" solution in the ratio of 2 g/l.
<b>Chlorhexidine</b>	Cleaning the operative site and disinfecting instruments (70% solution alcohol; 1:400; exposition period — 2 minutes)		

### **Prevention of microorganisms' contact with the wound**

Prevention of the contact (contagious) infection requires that everything that touches the wound be sterile. This is achieved via disinfection of instruments, as well as cleaning the surgeon's hands and operative site. Sterilisation of the suturing material prevents both contact and implant infection of wounds.

Sterilising instruments, operating sheets, towels and dressing materials involves the following stages:

- stage 1 - preparation of the materials,
- stage 2 — preparing for sterilization itself,
- stage 3 — sterilization,
- stage 4 - safe-keeping of the materials sterilized.

All these stages are to be performed in accordance with specific standards «Sterilization and disinfections of materials for medical use».

### **Sterilization of instruments**

**Stage 1 — preparation of the materials** — is aimed at thorough mechanical cleansing of instruments; removal of pyogenic compounds and destruction of hepatitis viruses. The person responsible for this should always wear gloves.

The instruments that were used but not infected will be washed under running water separately with a brush for 5 minutes. In contrast, blood-stained equipment must be washed immediately (without subsequent drying!), then soaked in one of special washing solutions, warmed to a temperature of 50 °C for 15—20 minutes, syringes being dismantled before washing.

The formulations of the washing solutions are as follows:

- *Solution A*

Perhydrol -	20 g
washing detergent —	5
water —	975 ml.

- *Solution B*

2,5% hydrogen peroxide - 200 ml  
 washing detergent — 5  
 water - 795 ml.

After soaking the instruments, particularly their corners and folds, instruments are washed with brush in the same solution and then rinsed in warm water for 5 minutes and in distilled for another. The instruments are then packed into a drying air steriliser under the temperature of 85 °C; thereupon these are ready for sterilisation.

*The instruments contaminated with pus or intestinal contents* are first soaked in enamel containers with 5% lysol for 30 minutes, then washed in the same solution with brush, rinsed with running water and soaked in one of the washing solutions; the further steps are as given above.

It is noteworthy that the equipment used to operate on patient with anaerobic infection should be soaked in a special solution that contains hydrogen peroxide (6%) and washing agent (0,5%) for 1 hour, then washed with a brush in the same solution before boiling for 90 minutes (it is only after this that the instruments will be ready for thorough sterilisation as is the case with instruments which have not been infected).

*Injection needles* are washed by first attaching syringes to them using warm water and 1 % sodium hydrocarbonate, the canal being emptied with a mandrin and washed with 0,5% liquid ammonia and running water. The needle with its mandrin still in is then boiled for 30 minutes in 2% sodium bicarbonate and after 8—12 hours boiling is repeated in distilled water for 40 more minutes and dried. After this, the canal of the needle is to be dried by pushing in ether or alcohol with a syringe. The needles which have been contaminated with pus are thoroughly washed, the canal washed with running water and then soaked for an hour in 5% lysol, simultaneously washing the canal with lysol with the aid of a syringe before proceeding as in the case if the instruments have not been contaminated.

*Drug and blood transfusion sets* need to be washed thoroughly to prevent post-transfusion reactions and complications. Recently, these have been made disposable (to be used only once), which are sterilised by the producer. The other sets that can be resterilised will be dismantled immediately after use — the glass side, droppers and plastic tubes — to be thoroughly washed with running water by pressing on the plastic side to clear away any blood remnants. Certain parts of the system are soaked for 2 hours in a special solution (1% sodium bicarbonate and 1% ammonium solution) which had previously been warmed to the temperature of 60 °C. The other parts of the set should be boiled for 30 minutes in distilled water after washing with running water, washed again with water under pressure on the plastic tube to force out any blood stains, and boiled once again for 20 more minutes in distilled water. Thereafter, this set is arranged and packed for sterilisation.

Currently, medical *gloves are* disposable and previously sterilised by the manufacturer. If plastic gloves are to be used several times, those stained with blood are not disposed but washed under running water until all the blood is washed away, dried with a towel and soaked for 30 minutes in 0,5% ammonium or in a washing solution A or B. They are then to be washed with running water, dried, and packed for sterilisation.

To make sure the materials are free of blood stains following presterilisation, the benzidine test is applied. Three drops of 1 % benzidine and hydrogen peroxide are put on the material or instrument tested; a bluish-green coloration suggests the presence of blood. This requires that washing (stage 1) be repeated.

**Stage 2 — *arrangement and package for sterilisation.*** For sterilisation in an air-drying steriliser the instruments are arranged in a metallic box, vertically and in one layer with the lid open but lying by its side. Dismantled syringes are wrapped in two layers of special thick paper.

For the sterilisation in an autoclave (steam under pressure) the instruments are wrapped into towels or cotton cloth made into bag and arranged on a metal tray or net. Sets of instruments for typical operations on the heart, lung, bone, vessels are sterilised together; they are arranged on special trays and wrapped in sheets.

The cylinder and piston of the syringe are wrapped separately into gauze napkins then into a cotton bag, which is then placed into the dressing box. The sets are wrapped in cotton napkins and put in the steriliser.

Dried rubber gloves are sprinkled with talcum powder both inside and outside, arranged in pairs in gauze napkins and placed in a separate dressing box.

**Stage 3 — *sterilisation.*** Sterilisation of instruments, syringes (with the inscription «200 °C»), needles, glass containers is done with a dry-air oven (fig. 1). The materials are freely arranged on the steriliser's shelf and the apparatus switched on. With its doors open the steriliser is heated to a temperature of 80—85 °C to dry its interior and the instruments for 30 minutes. The doors are then closed and the temperature increased to 180 °C and maintained automatically; within 60 minutes the materials are sterilised. After switching off and cooling to 70-50 °C the door is opened, the metal container with the instruments is covered with its sterile lid. Within the next 15—20 minutes when the steriliser is cool the materials can then be removed.

Whilst working with the dry-air oven steriliser safety measures must be taken: the apparatus must be earthed, after sterilisation the door can be opened only when the temperature has reduced to 70-50 °C. It is forbidden to use a faulty apparatus.

Sterilisation of instruments can be done in an autoclave. The wrapped up materials are packed into the sterilising chamber. If the items are packed into a dressing box, then its lattice should be opened. Dressing boxes and other containers must be placed freely to allow an equal distribution of the steam.

Surgical instruments are sterilised within 20 minutes at 2 atmospheres (1 atmosphere =  $1,013 \times 10^5$  pa) which is the equivalent of 132,9 °C. The starting time for sterilisation is counted from the start of the required pressure. Plastic drainage tubes are sterilised at 1,1 atmospheres (steam temperature of 120 °C) for 45 minutes. When the dressing box is removed from the autoclave after sterilisation, its opening is closed immediately.

Sterilisation in the dry-air oven and autoclave are considered as the main methods. Boiling as a method of sterilisation is used in small centres, where there are no centralised sterilisation systems. Stationary or portable electrical heaters are used to sterilise instruments, glass objects, plastic drainage tubes, catheters and gloves. Distilled water is used to raise the point of boiling; 20 g of sodium hydro-carbonate per 1 liter of water is

added to destroy the bacterial sheath (2% solution). The bottom of the water heater is lined with a thin layer of material made up of cotton wool and gauze to absorb sediments onto it and not onto the instruments.

Dismantled, instruments are put on special net-trays and lowered by hooks down into the boiler such that their handles are left outside the boiler, which is then closed. Sterilization time is 40 minutes from the onset of boiling. At the end of sterilisation the net tray with instruments is raised by the hooks, allowed to drain and brought to a special table, which had been previously covered with a sterile sheet folded into four layers. The operating theatre nurse arranges the instruments on a big sterile table.

Instruments contaminated with pus and intestinal contents, after special cleaning as stated above can be sterilized by boiling for 90 minutes using a different boiler.

Instruments used for a patient with gas gangrene have to be handled carefully, with thorough cleaning and subsequent fractional sterilization by boiling. They are boiled for an hour, removed from the boiler and left to stand at room temperature for 12-24 hours (to allow the spores to germinate), and then boiled again for another one hour.

The main method used to sterilize plastic items (gloves, catheters, drainage tubes) is autoclaving. In very rare cases they are boiled for 15 minutes

Sterilisation of instruments that cannot stand heat (endoscopes, thoroscopes, laparoscopes, the set of instruments used for artificial blood circulation or for heart-lung bypass), are done in special gas sterilisers. Materials for sterilisation are put in airtight sterilisation chambers filled with ethylene dioxide. Exposition time is 16 hours with the temperature of 18 °C. A mixture of ethylene dioxide and methylene bromide under the temperature of 55 °C can also be used to sterilise within 6 hours.

**Sterilisation of optical instruments** (laparoscopes, thoroscopes, and choledochoscopes) can be done in alcohol solutions of chlorhexidine and povidone-iodine. Sterilisation of apparatus and instruments, using chemical compounds should be done in metallic containers with covers to prevent evaporation and pollution of the air in the room. In the absence of special containers they are sterilised in containers made of enamel or glass. The instruments are covered with water such that all of them are under the water and covered with the lid.

In emergency, when it is not possible to sterilise the instruments using any of the above-stated methods, sterilisation can be achieved by burning. 15— 20 ml of alcohol are poured into a metallic pan or dish, several instruments are put inside and the alcohol is burned. The burning method is not very reliable, can cause fire and explosion (in the presence of vapours of ether, etc). Because of these the method of burning is used only in extreme conditions, strictly taking fire safety measures.

When **cutting instruments** (scalpels, scissors) are sterilised in the ordinary way, they turn blunt, so it is better they are sterilised without heat. After pre-sterilisation they are put into 96% of ethyl alcohol for 30 minutes or in triple solution for 3 hours. Cutting instruments are allowed to boil for only a short period of time. The blades of scalpel are wrapped in gauze and placed on separate net tray and boiled for 10 minutes without adding sodium bicarbonate, and then they are put in 96% ethyl alcohol for 30 minutes.

**Stage 4 — Keeping the sterilised materials.** Sterile materials are kept in special containers. Sterile and non-sterile items may not be kept at the same container. Materials

can stay sterile in a dressing box, which has not yet been opened for 48 hours. If before packing in the dressing box the materials were wrapped in (towels, sheets or napkins) as is the case with rubber drains), then they can stay sterile for 3 days. In cases of centralised sterilisation syringes can be sterile for 25 days.

### **Sterilisation of dressing materials, operating sheets and suturing materials**

**Stage 1 — *presterilisation*.** Dressing materials include gauze balls, towels, pack, and swabs. They are used during operation and dressing mainly for keeping the wound dry, stopping bleeding, for drainage or for packing the wound. Dressing material is prepared from gauze and cotton wool and rarely from viscose and linen. They have to have the following characteristics:

- 1) they should be biologically and chemically inert and void of any negative effects on wound healing;
- 2) they should have good hygroscopic, or water absorbing, properties;
- 3) they should have a few free threads from outside; this will prevent pieces of thread from falling into the wound as these can act as foreign bodies in the wound;
- 4) they should be soft, elastic and not traumatise the wound;
- 5) they should be easy to sterilise without losing its qualities;
- 6) they should be cheap, considering its wide use. Annually, 200 metres of gauze and 225 pieces of bandage are normally spent per a surgical bed. Appendectomy alone, for example, requires about 7 metres of gauze.

Dressing materials are prepared from gauze that has been cut into smaller sizes. They are folded in a way that the cut edges are folded inside so that the threads do not hang freely outside. Enough material is always prepared so that there is always some reserved. To facilitate easy counting during operation they are arranged in a particular order before sterilisation: 50— 100 cotton wool balls in one gauze wrapper. Ten swabs tied in one pack. Operation clothes include the following: surgical gowns, towels, sheets, napkins, masks, caps, and boot-covers, which are normally made of cotton. Operation materials that are used several times (non-disposable) have to be marked and given to the laundry separately from those that are in the special bag. The gowns should not have pockets or belts. Gowns, bed sheets, napkins, towels for sterilisation are folded in rolls to make them easy to spread when using.

**Stage 2 — *package and preparation of materials for sterilisation*.** Dressing materials and operation sheets are packed in special containers (dressing boxes) (fig. 4). For the lack of such boxes they can be sterilised in thick cloth-bag.

In a universal package, the dressing box contains a set of materials for a typical minor operation (e.g. appendectomy, herniorrhaphy, phlebectomy).

In specific packages, the dressing box contains the set of materials for a specific operation (e.g. pneumonectomy, stomach resection). In a typical pack the dressing boxes contain packs of the same material (e.g. box of gowns, box of napkins, box of swabs).

The dressing box is first inspected to make sure it is in good condition, and is then lined with a sheet whose ends hang outside. Further, the dressing materials are arranged in a vertical position in sectors of packets. The materials should not be arranged too close to each other to allow for circulation of the steam. An indicator of the sterilisation regime is

placed inside (maximum thermometer, a melting material, or a test tube with test-microbes), the ends of the sheet are folded to cover, and the dressing box covered and locked with a padlock. A labelled plaster indicating the type of material is pasted on the box, and after sterilisation, the date and name of the one who did the sterilisation is added.

When the items for sterilisation are packed in a bag, they should not be arranged too tight, and the bag is tied with a special metallic tie. The bag is put into another bag and tied. When it is necessary to use the sterilised materials in the bag, it is placed on a table; the nurse assistant opens the first bag and pulls it down. The theatre nurse then opens the inner bag with sterile hands and removes the sterile items from it.

**Stage 3 — *sterilisation*.** It is noteworthy that an autoclave may be used only after it has been certified and the person in charge of the autoclave needs to be qualified appropriately. Using the steam-electric steriliser, one has to follow the exact instructions and safety measures.

- The equipment must be earthened.
- Faulty equipment should never be used.
- When in use, the equipment should be under control.
- Do not add water after the equipment has been switched on.

After sterilisation the apparatus should be switched off, and the ventilator closed not to let any more air into the sterilisation chamber.

The cover of the sterilisation chamber is opened only when the arrow of the manometer has reached the zero mark.

Sterilisation time is counted from the time when the manometer reaches the required pressure. Dressing materials and operation sheets are sterilised for 20 minutes at 2 atmospheres (temperature 132,9 °C).

**Stage 4 — *keeping the sterilised materials*.** After sterilisation ends the sterilisation chamber is emptied, dressing boxes are removed, all openings are immediately closed and brought to a special table for sterile materials. Dressing boxes are kept locked in a special room. With an intact dressing box dressing materials and sheets can stay sterile for 48 hours after sterilisation has completed. Dressing materials and sheets sterilised in the bag can stay sterile for only 24 hours.

### **Control of sterility**

The sterility of the items and the working regime of the steam steriliser can be controlled either by a direct or indirect method.

#### **Direct methods**

- Inoculation of medium with a swab of the dressing material.

To inoculate medium with a swab, open the dressing box in the operating theatre, using a sterile instrument. Soak a piece of sterile gauze in normal saline which is passed several times on the material to be tested, then drop the piece of gauze into a sterile test tube and send it to the microbiological laboratory

- ***Bacteriological tests.***

A test tube that contains reference non-pathogenic cultured microorganisms known to die, if exposed to a certain temperature, is used. Place the test tube inside the dressing box and send it to the laboratory after sterilisation is over. Absence of bacterial growth implies that the items are sterile.

The swabs should be taken from once every 10 days.

### **Indirect methods**

- Control of sterility of materials is done each time they have been sterilised. Compounds with known specific melting points are used for this purpose: benzoic acid (120°C), resor-cinol (119 °C), antipyrin (110 °C). These compounds are kept in ampoules. They can also be put into test tubes (0,5 g each), and closed with gauze plug. One or two ampoules are placed in between the layers of materials to be sterilised. Melting of the powdered compound into a liquid mass implies that the temperature in the box was at least as high as the melting point of the compound. If sterilisation is performed at 2 atmospheres (temperature 132,9 °C), compounds with higher melting points are used: ascorbic acid (187—192 °C), succinic acid (180—184 °C), pilocarpine hydrochloride (200°C), thiourea (180°C).

Thermometry is known to be the most objective indirect methods of sterility control. In each dressing box 1 or 2 thermometers are placed in between the layers of materials to be sterilised. The readings will indicate the maximum temperatures but not the exposition time, i.e. for how long such a temperature was maintained in the chamber. Hence this method does not preclude the use of direct methods like the bacteriological test.

### **Suturing material**

Materials from different sources (e.g. metallic brace, clips and wires) are used in sewing tissues together during operations. There are more than forty types of suturing materials: widely used are those made of silk, nylon, catgut, vicryl, metallic braces.

Both resolvable and non-resolvable threads may be used.

*Natural resolvable* threads are made of catgut. To lengthen the resolution time of catgut, metallic compounds are impregnated into them (chromic and silver catguts). The examples of *synthetic resolvable* sutures are daxon, vicryl and oxylon.

*Non-resolvable natural* sutures include sutures made of natural silk, cotton, yarn; their *synthetic* equivalents are dacron, nylon, ftolon, silk, kapron, etc.

Suturing material should meet the main requirements as follows:

- have smooth level surface without causing additional damage to the tissues;
- have good manipulating qualities — slip easily through tissues;
- be elastic (sufficient elasticity prevents tissues from being pressed on and necrotized when they subsequently become oedematous);
- be firm at the knots;
- be non-hygroscopic and not swell up;
- be biologically compatible with bodily tissues and not be allergic to the body.

Breakdown of the suture and healing the wound should be simultaneous.

Wound infection rarely occurs when suturing material with antimicrobial activity is used, this is achieved by incorporating into the sutures the antibacterial compounds (e.g. letinal-silk, ftorlonov, acetate and other sutures, containing nitrofurantoin, antibiotics). Synthetic sutures that contain antiseptics both possess all the qualities of clean materials and cause antibacterial effect.

Sutures can be sterilised with gamma rays by manufacturers. Silk or catgut sutures in ampoules can be kept at room temperature. Metallic suturing materials (wires, clips, braces) are sterilised in the autoclave or can be boiled while cotton sutures, lavsan, kapron



may be sterilised in an autoclave. Silk, kapron, lavsan, linen, cotton are sterilised by Kocher's method. Catgut is treated with iodine steam (Sitkov's method), in alcohol solution of Lugole (Gubarev's method) or in water solution of Lugole (Heinac-Claudius method). When catgut is sterilised by the Gubarev's method, it is kept in alcohol solution of Lugole. When Heinac-Claudius method is used, they are kept in 96% ethyl alcohol. Lugole's solution or alcohol should be changed each ten days; bacteriological control each time is obligatory. Silk is kept in 96% ethyl alcohol with a label showing the suture number, dates of preparation and of bacteriological testing. The alcohol should be changed every ten days and bacteriological test done simultaneously.

### **Preparation of the hands for operation**

Scrubbing of the hands is a very important way of preventing infection. Surgeons, operating theatre and dressing nurses should always see to it that their hands are clean, take care of their skin and nails. Taking care of the hands prevents from their cracking and callosity of the skin are prevented. The nails should always be trimmed and short. Whenever very dirty work is to be done manually, gloves should be it is better to worn. Taking good care of the hands should be regarded as a step in the preparation for operation. Whatever method of scrubbing the hands is used, this should start with mechanical cleansing.

Fuerbringer's and Alfred's methods are only of historic value and involve using sterile brush and sterile soap to scrub the hands. Soap is applied to the brush, which is kept in the right hand. After soaping the soap is placed on top of the brush and held at the hand which holds the brush. The brush or napkin should always be moved from outside the fingers to the elbow, fingers should be kept higher than the elbow and the stream of running water from the fingers to the elbows. Scrubbing with the brush is started and ended so that dirty water does not flow back from the elbow to the fingers. Scrubbing starts from the palmar aspect of each finger, then the dorsal aspects are scrubbed, the nail lodges, in between the fingers of the left hand, then the right, the palms and dorsal of the left, further the right hand, and lastly the hands up till the upper third of the forearm towards the elbow joint. The soapy foam is constantly washed away under the running water; the brush is soaped when necessary. Throughout the process of scrubbing it is forbidden to touch the tap, the water flowing; the temperature having been regulated before scrubbing is starts. At the end of scrubbing, the brush and soap are put on a table, the hands rinsed and with the fingers at the level of the chest they are dried with sterile a gauze or napkins, without touching the parts that were not scrubbed. Later on, depending on the method used, the fingers, hands, palms and the lower parts of the forearm are wiped with gauze soaked with alcohol solution and other antiseptics.

- **Pervomur (C-4)**

Pervomur is a solution that contains formic acid and hydrogen peroxide. The main solution is prepared initially in the ratio of 81 ml of 85% formic acid and 171 ml of 33% hydrogen peroxide which are mixed in a glass container with a plug and kept in the refrigerator for 2 hours, with periodical shaking. The two compounds react to form a type of the acid with a stronger bactericidal effect. From this amount of the main solution ten litres of 'working solution' of pervomur can be prepared via diluting it with distilled water.

The working solution can be used within a day. Preparing the solution, one has to wear gloves to prevent the concentrated solution from burning the hands. Washing with running water and soap for a minute first precedes disinfection of the hands. The hands and forearms up to the middle third are then washed in the bowl with pervomur for another minute and dried with a sterile napkin. As many as five people can use the same bowl of solution.

- **Chlorhexidine (0,5% alcohol solution)**

The hands (the finger up to the midforearm) are smeared with gauze swabs soaked in the solution of chlorhexidine for about three minutes; prior to this the hands are washed with soap for a minute.

- **AHD solution and Eurosept**

These solutions contain the antiseptics such as ethanol, chlorhexidine, and poly-ionic fatty acid ether. The hands are first washed with soap and running water for a minute. A few millilitres of the solution are then poured onto the hands twice and rubbed for 2—3 minutes each.

The hands can also be cleansed by rubbing the hands with 96% ethyl alcohol for 10 minutes (Brun's method) or with 2% alcohol solution of iodine for 3 minutes.

### **Cleaning the operative field**

Preparation of the place of the expected incision (operative field or site) starts on the day preceding the operation, which includes hygienic baths and a change of underwear. On the day of operation, the skin of the expected place of incision is dry-shaved and cleaned with alcohol.

### **Prevention of wound infection implantation.**

The largest value in the event of implant infection has stitches.

For tissue during surgery using yarns of different origin, metal clips, shackle, wire. There are more than 40 types of suture material. The most widespread are silk, polyester, nylon, catgut, metal bow.

Applied filaments which dissolve and threads that do not dissolve. Natural yarns, which are absorbed, there is a thread of catgut. Extension of period of absorption of catgut is achieved by impregnation of its metals (chrome, silver catgut). Use synthetic yarns which dissolve - with thread deksonau, vikrilu, oksilonu, etc. By natural yarns that do not resolve, are the threads of natural silk, cotton, horsehair, to synthetic - threads of nylon, polyester, Dacron, nylon, ftorlon, etc.

Stitching material must meet the following basic requirements - must have a fat, smooth surface and not cause further damage to the tissues, have good dexterity properties - good slide in the tissues, be flexible (sufficient extensibility prevents compression and necrosis of the tissues in which increasing edema), be strong in the site, do not have the hygroscopic properties and do not swell, be biologically combined with living tissues and do not allergic effects on the body. The destruction of threads should coincide with the time of wound healing.

Suppuration of wounds occurs significantly less when using sutures, which possess antibacterial activity due to their structure imposed antimicrobials (letilan-Dacron, ftorlonovye, acetate and other filaments, which contain nitrofurantoin drugs, antibiotics,

etc.). Synthetic strands that contain antiseptics have all the advantages such as sutures and at the same time have an antibacterial effect.

**Stitching material** may be sterilized by  $\gamma$ -radiation at the factory. In ampoules winding silk catgut, nylon stored at room temperature and used as needed. Metallic suture material (wire, bows) are sterilized in an autoclave or by boiling, the filaments of polyester, nylon - by boiling in a solution pervomur.

## 6. Materials for self-control.

### 6.1. The tasks for self-control.

#### Questions:

1. . The structure and organization of the surgical department.
2. Characterization of concepts hygienic and anti regimes in surgical wards.
3. Hygienic requirements for nursing clothes.
4. Hygienic requirements for garments patients.
5. Hygienic requirements for bedding patients.
6. Hygienic requirements for a change of clothes, in the care of the sick and seriously ill patients.
7. Principles of diagnosis of nosocomial infections, prevention of its spread.
8. Wet cleaning in the surgical department with the use of antiseptics.
9. Replacing underwear patients with common and bed rest.
10. Bed linen and patients with a total bed rest
11. How is the preparation of instruments for sterilization?
12. How to prepare the cleaning and disinfecting solutions?
13. What is the quality of the sample prior-processing tools do you know?
14. How do you sterilize cutting, optical and general surgical instruments?
15. What types of suture material and methods of sterilization, you know?

#### Tasks:

1. . Spend a wet cleaning in the surgical department with the use of antiseptics.
2. Replace patient's underwear with a total bed rest.
3. Spend a change of bed linen and patients with a total bed rest.
4. Prepare instruments for sterilization
5. Prepare washing and disinfecting solution
6. Perform tests on the quality of prior-processing tools
7. Spend sterilization cutting, optical and general surgical instruments.
8. Spend the sterilization of suture material.

### 6.2. Situational tasks:

1. Content what products it is advisable to increase in the human diet with reduced gastric secretion?
  - A. Sweet
  - B. Bouillon
  - S. Salt
  - D. Milk

E. Sala

2. When administered 100 ml of 25% (saturated) solution of magnesium sulfate, there are many rare bowel movements. Why?

- A. hindrance to the work of the intestine
- B. stimulates the secretion of gastric juice
- C. increases the osmotic pressure in the gut
- D. Stimulates the release of hormones duodenum
- E. Reduced osmotic pressure in the gut

3. During surgery on the lungs of the patient appeared cardiac arrest. Regular reduction of it was restored only after 10 minutes. Which organs of profound changes have taken place as a result of hypoxia?

- A. spleen
- B in the heart of
- C. Liver
- D. In kidneys
- E. In the cortex of the main brain

4. The laboratory conducts research about the diagnosis of tetanus. What method of sterilization must destroy pathogens isolated culture of tetanus?

- A. Autoclaving
- B. Boiling
- S. Tindalization
- D. Dry heat
- E. Pasteurization

5. In the surgical hospital, the cases of postoperative septic complications of staphylococcal nature. How to determine the source of a staph infection in the hospital?

- A. Definition of sensitive to the antibiotics
- B. Definition of blood toxins
- C. Definition of enzymes aggression
- D. Definition of biovars
- E. Definition of fagovars

6. The patient after prolonged use of antibiotics developed intestinal dysbiosis. What drugs should be assigned to the restoration of normal microflora?

- A. Sulfanilamide
- B. Eubiotics (probiotics)
- C. Interferon
- D. antifungal
- E. Nitrofurans

7. In determining the number of microbial air ward turned out that it is 1500 cfu / g What groups of organisms considered in this?

- A. Bacteria and viruses - pathogens of respiratory infections
- B. All of the bacteria that have grown in a nutrient medium
- S. Staphylococcus and hemolytic streptococcus
- D. Causative agents of hospital infections
- E. All of the pathogenic and opportunistic bacteria

8. The hospital decided to conduct quality control instrument sterilization in an autoclave using biological methods. What bacteria should be used as test organisms?

- A. Disputes
- B. Capsule
- C. Acid-resistant S.
- D. Pathogens
- E. Thermophilic

9. For the treatment of the surgical field applied to the patient a drug that is chemically dihalorcontent of biguanide. The most active local antiseptic, reveals a rapid and strong bactericidal activity against gram-positive and gram-negative bacteria. Which is a drug?

- A Valium
- B. Brilliant Green
- C. Urotropinum
- D. Phenasalum
- E. Unitiolum

10. In the hospital the patient was hospitalized 42 years with extensive crushed thigh injury. What types of antiseptics should be used in this patient?

- A. The mechanical
- B. Mixed
- C. Physical
- D. Chemical
- E. Biological

11. Choose the most complete and accurate definition of the central sterilization department (CSSD).

- A CSO is an independent specialized branch that can serve a number of health care institutions (LPZ) and is headed by the chief physician LPZ, in which it is affiliated;
- B. CSO is an independent organization dedicated subsection LPZ, led by an older sister, is subject to the chief doctor LPZ, of which it is part, and it serves only LPZ;
- C. The CSO is an independent organization dedicated subsection LPZ, led by an older sister and can serve a number of LPZ;

D. SSC is an independent organization dedicated subsection LPZ, can serve several LPZ, headed by an older sister and is subject to the chief doctor LPZ, of which it is part.

E. CSO is normal ward in the hospital.

12. Choose the most complete and correct answer. According to what regulations central sterilization department (CSSD) carries out its work?

A. according to regulations of the Ministry of Health;

B. according to regulations of the Ministry of Health and the applicable law;

C. according to the orders of the head physician of health care institutions and applicable laws;

D. the orders of the chief doctor of health care institutions;

E. according to the order department head.

13. Choose the most complete and correct answer. The main goal of the central sterilization department is

A. provision of high-quality sterilization of medical products;

B. providing high prior-treatment and sterilization of medical products;

S. obespechenie high prior-processing, sterilization of medical devices and storage;

D. ensuring high prior-processing, sterilization of medical products and its supply of health care institutions.

E. providing Sanepid regime at a health care institution.

14. On the problem of the central sterilization department does not include:

A. ensuring the delivery of health care products (CP) in the department of health care institutions (LPZ);

B. Admission IMNiz offices LPZ;

C. Determination of the range of medical devices that are subject to sterilization, the distribution of products and the direction of the flows of processing, depending on the type of material of which is made of medical devices (metal, rubber, textile, etc.);

D. Conducting prior-processing of medical devices;

E. Sort of medical devices offices LPZ.

15. Which statement is incorrect with regard to the central sterilization department (CSSD)

A. To CSO staff composition does not include physicians;

B. By CSO staff composition includes middle and junior medical staff;

C. To the CSSD staff composition includes middle and junior medical staff, headed by a medical officer of the SSC;

D. By CSO staff composition includes middle and junior medical staff;

E. CSSD headed older sister.

16. Which of the following premises are not part of the sterilization department?

A. Reception and forwarding;

- B. washing and sterilization;
- S. sterile zone;
- D. expedition and observation;
- E. packaging.

17. According to what standard document organized work in the sterilization unit?

- A. The Industry Standard Ministry of Health (OST 42-21-2-85);
- B. Order of the main doctor in charge of treatment and prophylactic institution, which includes sterilization department;
- C. The disposal of senior nurse, who heads the sterilization department;
- D. the industry standard of the Ministry of Health of Ukraine (GTS 03/12/42 - 00).
- E. disposal head of surgical department.

18. Choose the most complete and correct answer. Sort of medical products that reach the sterilization department is in accordance with

- A. The date of receipt;
- B. labeling and separation of the material from which the item is manufactured medical devices;
- C. The material from which the item is manufactured medical devices;
- D. Ost 42-21-2-85;
- E. labeling department.

19. Choose the most complete and correct answer. For samples for occult blood are:

- A sample of phenolphthalein;
- B. test for sterility;
- C. azapiramovaya sample;
- D. phenolphthalein and azapiramovaya sample;
- E. doping test.

20. To the equipment of sterilization (autoclaving) are not included:

- A. stoly;
- B. chairs;
- C germicidal lamp;
- D. cart;
- E. autoclaves.

### **6.3. Tests for self-control (basic knowledge):**

1. The How long tools sterilized in an autoclave at temperature and pressure 2atm 132 ° C?

- a) 20 min;
- b) 35 min;
- a) 45 minutes;
- g) 1 hour;

d) 1 hour and 30 minutes.

2. How sterile synthetic material?

- a) boiling;
- b) the pressurized steam;
- c) soaked in alcohol;
- g) was soaked in a solution of Lugol;
- d) dry heat.

3. Posev to monitor the effectiveness of sterilization of suture material should be performed 1 time for:

- a) 3 days;
- b) 5 days;
- a) 10 days;
- d) 15 days;
- d) 20 days.

4. When storage of sterile silk in the bank alcohol should be changed every:

- a) 3 days;
- b) 5 days;
- a) 10 days;
- d) 15 days;
- d) 20 days.

5. What sterilization method of the surgical instruments the most reliable and fast in the surgical department?

- a) the autoclave under pressure;
- b) steam in an autoclave;
- c) in the dry-top land wardrobe;
- g) a germicidal lamp;
- d) gamma irradiation.

6. What of controls over the sterility of the contents Bix most reliable?

- a) the method Mikulic;
- b) the melting point of sulfur;
- c) the melting point of sulfur as a flame retardant;
- g) bacteriological;
- d) the melting point of sulfur-benzoic acid.

7. Steams of formalin are sterilize:

- a) cutting tools;
- b) rubber gloves;
- c) instruments with optical systems;



- g) Dressings;
- e) operational linen.

8. What stored in Lugol solution after sterilization?

- a) silk;
- b) catgut;
- c) nylon;
- d) polyester;
- e) vicryl.

9. On what minimum temperature of sporeforming bacteria are killed?

- a) 60 ° C;
- b) 80 ° C;
- c) 100 ° C;
- g) 120 ° C;
- d) 140 ° C.

10. On what temperature sterilize instruments in a hot air oven?

- a) 180 ° C;
- b) 150 ° C;
- c) 100 ° C;
- g) 120 ° C;
- d) 140 ° C.

11. How retain silk after sterilization by Kocher?

- a) 96 ° alcohol;
- b) in a solution of mercuric chloride 1:1000;
- c) Lugol's solution;
- g) in dry, sterile jar;
- e) pervomure.

12. Which method is sterilizing stitching material in factory conditions?

- a) autoclaving
- b) boiling
- c) gamma irradiation;
- g) a hot air oven;
- d) soaked in alcohol

13. Disinfection of the surgical instruments can be used to hold the following methods:

- a) immersing in a 10% bleach solution for 60 minutes.
- b) immersion in 10% bleach solution for 60 minutes.
- c) immersion in a 1% chloramine solution at 60 minutes.
- d) immersion in 6% hydrogen peroxide solution for 1 hour.

d) immersion in distilled water at 100 ° C for 30 minutes.

14. Disinfection of the surgical instruments can be used to hold the following methods:

- a) immersion in 2.4% solution pervomura 15 minutes.
- b) immersion in distilled water at 100 ° C for 30 minutes.
- b) immersion in ethyl alcohol at 960 for 30 minutes.
- z) immersion in 10% solution chloramine by 60 minutes.
- d) immersion in 0.2% solution dezaktina for 1 hour.

15. Laparoscopies and cystoscopies should be sterilized:

- a) boiling;
- b) autoclaving;
- b) immersion in ethyl alcohol at 960 30 minutes;
- g) a hot air oven;
- e) immersion in pervomur

### **Tests and tasks to check the source of knowledge**

1. In the ward was made bandage to the patient after surgery for gas gangrene. What must be done with the used tools during this bandaging?
2. Theater sister of the operation unit conducted a benzidine test on the quality of prior-processing equipment. However, it had a blue-green color in one of the control instruments. What does this result? What should I do in this case?
3. Theater sister operation unit ortotuloidinovuyu conducted a test on the quality of prior-processing equipment. However, it had a bright green color on one of the control instruments. What does this result? What should I do in this case?
4. A nurse holds a control sample amidopirinovuyu the quality of prior-processing equipment. It dealt a 3 drops of one of the tools (drops caused by cutting part of scissors), which have been in this game and have been processed, and was no color. To what can we conclude? Can be considered to be completed prior-processing of the batch tools?
5. A nurse conducted a test on the quality of n predsterilizatsionnoy processing of the surgical instruments. It struck on the working surface of the clip to 3 drops of 1% solution of benzidine hydrochloride. Coloring the site of application of the reagent has not arisen. To what can we conclude? What might have made a mistake nurse?
6. A nurse conducted a test on the quality of prior-processing of the surgical instruments. It struck at 2 instruments and 2 drops of 1% alcoholic solution of phenolphthalein and got a pink color. What does the result of the test is to be made a party to this instrument, which took place prior-cleaning?

7. From an operating nurse brought to the sterilization of surgical instruments that are heavily contaminated with dried blood. This tool should be prepared for sterilization. How can I clean this equipment from contamination prior to the prior-processing?
8. The surgical instrument was used during surgery in a patient with peritonitis. The nurse after the surgery began to prepare this toolkit to sterilization and started to wash it under running water with a brush. What a mistake is made by a nurse? How it was supposed to go with the surgical instruments?
9. The nurse should prepare 10 liters of cleaning solution for integrated sterilizing cleaning tools. How does she do it?
10. Operating nurse spent sterilizing cleaning of the surgical instruments. She rinsed tool in running water for 1 minute, plunged it into the detergent at 50 ° C for 15-17 minutes and washed every tool in the detergent with a brush for 1 minute, rinsed tools in running water for 5 - 10 minutes, rinsed in distilled water blocked, dried in a heat cabinet. What more needs to be done at installation tools for its sterilization trays in a hot air oven?
11. Operating nurse spent sterilizing cleaning of the surgical instruments. She rinsed tool in running water for 1 minute, plunged it into the detergent at 50 ° C for 15-17 minutes and washed every tool in the detergent with a brush for 1 minute, rinsed tools in running water for 5 - 10 minutes, allow to dry in a hot air oven. Is it true she spent sterilizing cleaning?
12. Operating nurse spent sterilizing cleaning of the surgical instruments. She rinsed tool in running water for 1 minute, plunged it into the detergent at 50 ° C for 15-17 minutes and rinse instruments under running water for 5-10 minutes and rinse them with distilled water, dry it in a hot air oven. Is it true she spent sterilizing cleaning?
13. Operating nurse spent sterilizing cleaning of the surgical instruments. She plunged it into the detergent at 50 ° C for 15-17 minutes and washed every tool in the detergent with a brush for 1 minute, rinsed tools in running water for 5-10 minutes and rinse them with distilled water and allow to dry in a hot air oven. What mistake allowed the nurse?
14. Operating nurse spent sterilizing cleaning of the surgical instruments. This tool rinse in running water for 1 minute, washed in each detergent tool with a brush for 1 minute, rinsed in running water, instruments for 5-10 minutes, rinsed in distilled water blocked, dried in a heat cabinet. What mistake allowed the nurse?
15. Operating nurse spent sterilizing cleaning of the surgical instruments. She rinsed tool in running water for 1 minute, plunged it into the detergent at 50 ° C for 15-17

minutes and washed every tool in the detergent with a brush for 1 minute, rinsed them with distilled water, dry it in a hot air cabinet. What mistake allowed the nurse?

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## 8. The distribution points are awarded to students:

At mastering topic number 4 to module 1 for training activities for students rated a 4-point scale (traditional) scale, which is then converted into points as follows:

rating	Points
5 (excellent)	5
4 (good)	4
3 (satisfactory)	3
2 (poor)	0

Guidelines prepared

Associate Professor, Department of General Surgery

Chorna I.O. \_\_\_\_\_