

**MINISTRY OF HEALTH OF UKRAINE**  
**POLTAVA STATE MEDICAL UNIVERSITY**  
 Department general surgery with care of the patient

“APPROVED”

The head of the department  
 of general surgery with care of the patient  
 professor \_\_\_\_\_ Ligonenko O.V.  
 “ ” \_\_\_\_\_ 2021

**METHODICAL INSTRUCTIONS**  
**FOR STUDENT SELF-DIRECTED WORK**  
**WHEN PREPARING FOR AND DURING 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 4.</b>	<b>Injury and damage.</b>
<b>Lesson theme №18</b>	Burns: classification, clinic. First aid for various types of burns. The defeat of the light radiation of a nuclear explosion. Burns caused by incendiary compounds.
<b>Years of study</b>	<i>III</i>
<b>Faculty</b>	<b>Medicine, Foreign students training faculty</b>

Poltava 2021

<b>Content module 4.</b>	<b>Injury and damage.</b>
<b>Lesson theme №18</b>	Burns: classification, clinic. First aid for various types of burns. The defeat of the light radiation of a nuclear explosion. Burns caused by incendiary compounds.

### **1. Relevance of the topic :**

Thermal injuries are a type of injuries occur relatively often : burns - 3%, electrocution - 2.5% of accidents.

In case of burns of any location and etiology of the wound process proceeds according to the general laws of tissue damage . Burns are more likely to be domestic ( they make up 92 % ), less work-related injuries .

Of the total number of affected 15 % are children under 15 years , half of them are injured in 3-4 years.

According to the World Health Organization, the custody of the frequency rank third among other injuries , and in some countries - the second , behind only the transport injury.

The relevance of thermal injuries is determined by a relatively high frequency in their home and at work , the severity of the burn injury , complexity and duration of treatment of patients with burns , frequent disability and high mortality .

Even in peacetime, the overall mortality rate for burns in adults according to the burn center of Kiev in 2000 was 7.5 % (Prof. M. Felt Yu ) , in 2005 - 9 % , which is equal to the average indicators of mortality in Europe.

In recent years, the number of burns in Ukraine has decreased to an average 145 thousand cases per year ( MY Felt ) . In the United States during peacetime care receive 6-8 % of people dying from them each year 10 thousand people.

Urgency of the problem is defined and its crucial importance for the modern military surgery . In wartime, the guardianship is obtained by burning military equipment (tanks , planes , infantry fighting vehicles ), and the use of incendiary mixtures.

### **2 . Learning Objectives :**

1. Classified thermal burns , learn their symptoms.
2. Classified chemical burns , learn their symptoms.
3. Classified radiation burns , learn their symptoms.
4. Determined depth of degrees of burns .
5. To show methods for determining the area affected and the severity of the patient with burns .
6. Know pathogenesis of burn .
7. Know clinical picture of different degree of burn .
8. Know diagnosis of burn .
9. Organized measures to provide first aid to the victim with burns .
10. Administrated local conservative treatment of burn wounds .

## 12. Determinated indications for surgical treatment of patients with burns.

### Basic knowledge , skills , habits, necessary for studying the topic ( interdisciplinary integration)

The names of the preceding disciplines	The skills
1. Anatomy human histology and embryology	Describe the anatomical and histological features of the structure of external coverings of man.
2. Organic and inorganic chemistry	Identifies the chemical structure of substances that have antiseptic properties.
3. Biological physics	To know about the consequences of their interactions with other organic and inorganic compounds, and environmental factors.
4. Microbiology	Define and identify the parameters of the physical factors of the action of the thermal factor: supports the skin and tissues, the specific heat, thermal conductivity.
5. Pathophysiology	Describe the major groups and properties of the bacterial flora that plant grows on the wounds. Pathogens that cause sepsis and septic.
6. Propedeutic Internal Medicine	Pathophysiological responses and tissue damage during inflammation, the pathogenesis of burn shock, the pathogenesis of toxemia, sepsis
7. Latin	Symptomatology know, to be able to carry out the clinical, laboratory and instrumental diagnostics.

#### The student must have an idea :

- Changes in local tissue burns ;
- The general reaction of the body burns ;
- Modern classification of burns ;
- A non-specific resistance of the organism ;
- On general provisions and principles of purulent surgery ;
- About the anatomical and physiological characteristics of the areas where localized pathological process .

#### The student should know :

- Definition and classification of burns ;
- Methods for determining the area of the burn ;
- Ways to predict the flow of burns ;
- Local and general changes in the body burns ;
- Definition of burn disease , etiopathogenesis and clinical picture of each stage.

#### The student should be able to:

- Provide first medical aid in the thermal and chemical burns ;
- To assess the depth of the burn, the burn area to define ,
- to assess the severity of the burn ;
- To carry out primary processing burn surface ;
- To carry out the local treatment of burns ;

#### The mastery of the practical skills of students:

- To determine the depth of the lesion ;
- Demonstrate the methods for determining the area affected in patients with burns;

- To organize the arrangements for the provision of first aid to the victim with burns;
- Appoint a local conservative treatment of burn wounds ;
- Adjust lighting field dressing ;
- To learn to wash the burn wound with an antiseptic solution ;
- To master certain techniques for bandaging patients ( keep tweezers, use the clip and so on);

#### **4. Tasks 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:**

##### **4.2 . Theoretical questions for the class :**

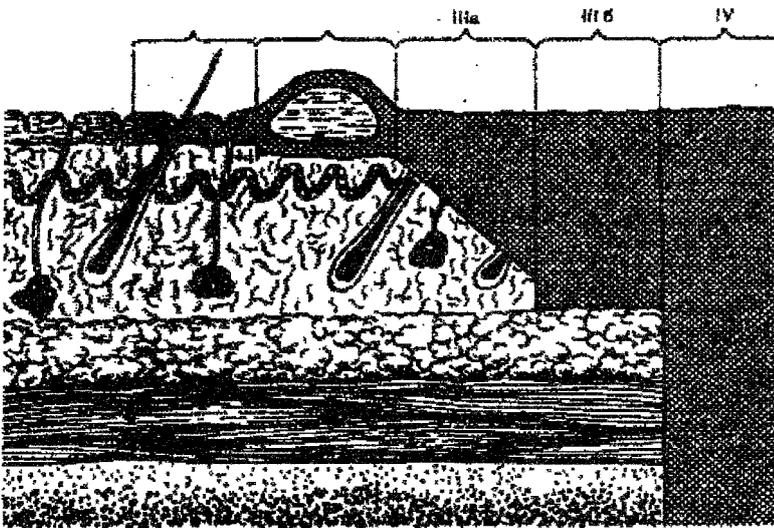
1. Classification of burns etiological factors ( thermal, chemical , beam )
2. The classification of the depth of damage - the current classification , the international classification .
3. Determination of the area affected by the rule Wallace ( " nine" ) .
4. Determination of the area affected by other methods.
5. Clinical manifestations of thermal, chemical , radiation burns .
6. Stages of evacuation of burn victims ( where and who provides assistance) .
7. First aid for burns .
8. Treatment at the stages of evacuation ( skilled and specialized care ) .
9. The phases of wound healing in burns .
10. Local medical treatment according to the phases of the wound healing process.
11. Local surgical treatment of burn wounds .
12. The main types of surgery for burns .
13. Complication of burns .
14. Convalescence , the principles of treatment.

##### **4.3. Practical work (tasks ) , which are carried out in class :**

- Diagnose the depth of burns defeat.
- Diagnose burns over an area of damage.
- Provide first aid to the injured on the town .
- To provide first medical aid to victims with burns .
- Determine the period of burn disease .
- Set the examination of the patient .
- Provide medical treatment of burn wounds according to the phases of wound healing .
- Know the basic group of drugs for the local treatment of wounds.
- Provide local treatment of wounds in order to prepare them for autodermoplasty .
- Take swabs - crops on the microflora and their sensitivity to antibiotics.
- Remove and bandage .
- Perform necrotomy with deep burns .

- Transporting patients to the dressing .
- Placing the patient at the dressing table according to the zone of the dressings.
- Processing of hands to perform ligation .
- To be able to put on a sterile gown .
- Prepare a kit for washing the burn wound and drains ;
- Technique of the dressings ( bandages previous removal , removal of dead tissues and pus film processing operation field , etc.).
- Apply rollers bandages.
- Taking the material on the bacteriological control .

## 5 . The content of the topic.



**BURN** is injury of tissues appearing as a result of local action of high temperature, chemical substances, electricity , and ionizing radiation.

According to the origin we distinguish the following kinds of burns: thermal, electric, chemical & radiation

Degrees of thermal burns by Aryev

According to the depth of

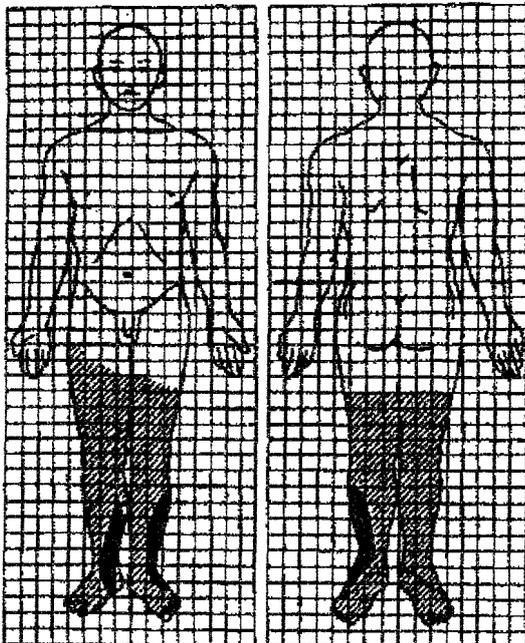
injury we distinguish 4 degrees:

- **I degree** - the injury of epidermis with the appearance of hyperemia & swelling of skin
- **II degree** - the injury of epithelium with the formation of blisters fill of pellucid fluid
- **III degree** - necrosis of skin:

**IIIa degree** - necrosis of epithelium & superficial layer of derma

**IIIb degree** - necrosis of derma with hair bulbs, sweat & sebaceous glands & fatty tissue

**IV degree** - necrosis of skin & profound tissues (fatty tissue, fascia, muscles, bones).



*Skitszes for marking & determining of burns area by Vilyavin's method (I degree - yellow colour) II - red, III - blue, IV - black, grafts green)*

The burns of I, II, III a degrees are considered superficial, IIIb & IV degree - deep. Such a division is principle because superficial burns can heal spontaneously (the sources of epithelization are kept), in deep burns these sources die & spontaneous

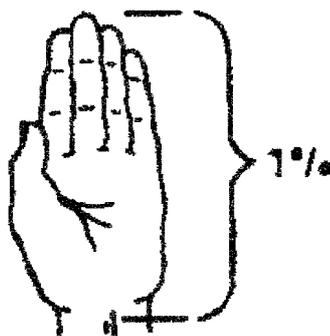
healing is impossible, dermoplasty is required.

In western countries the classification according to Kreibich is adapted in which 5 degrees are distinguished (IIIb → IV, IV → V).

The important role in burns is played by the area of burns moreover we are interested not in the absolute area but relative area in per cents from the total surface of the body.

### There are some rules for the determination of burn area

1. Method by Glumov (rule of palm) - burn area is measured by the palm of the hand which has an area 1 % from the whole body.



#### Method by Glumov (rule of palm)

2. Method by Wallace (rule of a nine) - the total area of skin is divided to parts the area multiple to nine head & neck – 9%, every upper extremity - 9%, every lower extremity – 18%, front surface of chest & abdomen - 18% " back surface of chest & abdomen - 18%, perineum – 1%. This method is very simple but not very exact.

3. Method by Postnikov - sterile plastic is put of the surface of burn, its outline is drawn on' plastic, than it is removed & the area is measured with the help of millimeter paper.

4. Weight method - sterile celloidin is put on the burn, outlines are drawn, a part of celloidin is cut out along outlines & weighed; knowing the weight of 1 cm<sup>2</sup> we very exactly determine the area of burn

5. Method by Vilyavin - the outline of human body is drawn on the paper, which is divided into squares which consider determined area in real man; the squares are hatched with colour pens & later the real burn area is determined with special tables (look tables 1 & 2).

**Table 1. Relativeratio of burn area to the body surface**

Burn Area (cm <sup>2</sup> )	% from the whole body area	Burn area (cm <sup>2</sup> )	% from the whole body area
1	0,006	3000	18,75
5	0,031	4000	25,0
10	0,062	6000	37,5
50	0,312	8000	50,0
100	0,625	10000	62,5
500	3,125	12000	75,0
1000	16,25	14000	87,5
2000	12,5	16000	100,0

**Table 2. The determination of burn area in separate localization**

Part of the body	Area in cm <sup>2</sup>	% of total area
<b>HEAD</b>		
Face	500	3,12
Hair part of head	478	2,99
<b>TRUNK</b>		
Neck (front)	240	1,5
Chest & abdomen	2900	18,0

Neck (back)	200	1,25
Back	2560	16,00
<b>UPPER EXTREMITY</b>		
Ann	625	3,9
Foreann	450	2,8
HAND	360	2,25
<b>LOWER EXTREMITY</b>		
Thigh	1625	10,15
Shin	1000	6,25
Foot	515	3,22

Local changes in burns move in such a way: primary anatomical & functional changes, reactive & inflammatory processes, regeneration.

**Burns of I degree** are characterized by hyperemia, swelling of skin & pain, skin is raised a little above healthy tissues. In some days upper layer of epithelium dries & rejects.

**Burns of II degree** are characterized by hyperemia, swelling of skin & pain, skin is raised a little above healthy tissues, on changed skin thin-wall blisters with limpid fluid appear. By the 10-12 day spontaneous epithelization takes place.

**Burn of IIIa degree** is characterized by hyperemia, swelling of skin & pain) skin is raised a little above healthy tissues, on changed skin thick-wall blisters with limpid fluid & dry light-brown or soft light-grey crust appear. Epithelization takes place at the expense of hair bulbs, sweat & sebaceous glands & marginal growth.

**Burn of IIIb degree** is characterized by the formation of firm dry brown crust (in burns by fire or scorching thing) or moist necrosis (in scalding). The regeneration begins at the expense of marginal growth of epithelium & scarring (mainly) ..

**Burn of IV degree** appears in long thermal action in places without thick fatty layer & is characterized by the formation of firm dry brown or black crust, charring of tissues.

Differential diagnostics of IIIa & deep burns is principal for care of patients.

Some simple methods help us:

1. the determination of sensitivity by a needle: of the patient does not feel the pain in pricking the burn is profound
2. . to give the patient oxytetracycline & in I hour to radiate him in dark room by UV lamp - superficial burns shine with yellow colour
3. temperature of skin in burns of IIIb degree is 1,5-2 degrees less in comparison with the burns of IIIa degree
4. skin is coloured according to Van -Gison - burns of I- II degree are coloured brightly-rose, IIIa degree -light-yellow, deep burns - brightly-yellow. Enormous burns are very dangerous for the patient.

For adults critical state is considered in total burn of I degree, 30% in burns of II & IIIa degrees, 10-15% in burns of IIIb & IV degree & burns of face, upper respiratory tract, perineum also. The simplest methods of the determination of prognosis are:

1. **rule of a hundred** - patient's age + % of burned skin (for adults only) if sum is < 60 - prognosis is favourable 61-80 - prognosis is relative favourable 81-100 - prognosis is doubtful > 100 - prognosis is unfavorable

2. **Frank's index** - area of superficial burns (%) + area of profound burns (%) x3 if sum is < 30 - prognosis is favourable 31-60 - prognosis is relative favourable 61-90 -

prognosis is doubtful 91-120 - prognosis is relative unfavorable 120 - prognosis is unfavorable

### **The phases of wound healing process of burn wounds :**

- a) The primary alteration
- b) phase exudation - lasts from 1 to 3-5 days after the burn, characterized by edema , leukocyte infiltration in the burn area .
- c) phase of secondary alteration and demarcation - lasts from 5 to 8-10 days , is characterized by dissociation of dead tissue from living and reducing edema.
- g ) the phase of wound cleansing of necrotic tissue - lasts from 10 to 15-17 days , is characterized by suppuration and necrosis of tissue rejection , on the border with the formation of healthy granulation tissue , that is, young connective tissue.
- d ) the phase of regeneration or repair ( epitelizatsii and reorganization of the scar ) - comes after 17-21 days , is characterized by scarring and epitelizatsiey burn wound and can be very long . It can speed up to surgery - skin grafting .

**The period of convalescence** is after restoring the skin. The length of his varied, depending on the degree of degenerative and inflammatory processes in organs , treatment time can range from baked 2-3 months to several years. Treatment fired - a comprehensive and includes general therapy , local treatment of burn wounds and surgical methods.

The treatment of burns includes 3 components: first aid, local treatment, general treatment.

#### First aid is carried out in such a turn:

- 1 . to stop the action of thernal agent on the skin
- 2.to cool burned parts with cold water or ice-bottle during IS min.
3. To put aseptic dressing
- 4: To introduce analgetics & begin anti-shock treatment
5. 10 bring the patient to the hospital.

The local treatment begins with the toilet of burn surface. This procedure is carried out in patients with limited burns without shock. Skin is covered with antiseptic solution, rejected epithelium & foreign bodies are removed, contaminated parts of wound are cleaned with H<sub>2</sub>O<sub>2</sub>, big blisters are opened & emptied, epidermis is not remover, it adheres to the wound surface & plays the role of biological dressing providing favourable conditions for the epithelization.

Local treatment of burns starts primary toilet burn wound bandaging with an antiseptic

**Primary toilet burn** wound is performed in the hospital setting : on the burned surface is removed foreign bodies , loose epidermis , large bubbles reveal the contaminated areas of burn wound irrigation solution antiseptics that do not contain alcohol ( furacillin , chlorhexidine , 3 % solution of hydrogen peroxide , betadine , jodobak , jodopiron ) , burn wound dried sterile wipes , swabs and dressings closed ( private method ) . The bandage protects the burn wound from contamination and external influences as well as promote local treatment of burn wounds .

In the first 5-7 days only apply wet- drying bandage to combat the infection. Treatment of burn injuries occur according to the phases of wound healing .

The use of drugs for the local treatment of :

- alteration - antiseptics on alcohol ;
- exudation - antiseptics hyperosmolar water-soluble ointment ;
- demarcation and rejection of necrotic tissue - fat-soluble antiseptics , proteolytic enzymes ;
- development of granulation and epitelisation - stimulating tissue growth (vitamins , amino acids, biologically -active substance).

### **6. Materials for self-control. A. Questions :**

1. To give a general description of the main historical stages of formation and development combustiology .
- 2 . Give the definition of burns.
- 3 . Classification of burns.
- 4 . Define the burn disease .
- 5 . Periods of burn disease .
6. Extent of burn shock .
7. The volume of first aid for burns .
8. Treatment of burn disease .
9. The phases of wound healing flow of burn wounds.
- 10 . Local treatment of burns.
11. Surgical treatment of burns in hospital ( Burn Center ) .
12. Biomaterial for dermoplastic group .
13. To give a general description of types dermoplastic temporary coatings.

### **objectives:**

1. Determine the area of the burn.
- 2 . Determine the depth of the burn.
- 3 . What are the percentage , according to the rule of nines , is head of an adult .
- 4 . Calculate the required amount of liquid on the Parkland formula .
5. Prepare a set for primary surgical treatment of burn wounds ;
6. List drugsfor the topical treatment of burns .

### **Case Studies :**

1. What determines the degree of severity of pain in burn wound ?
2. How are burns 1st degree clinically ?
3. What percentage of the adult human body is ahead?
4. What is the main pathogenetic mechanism of burn shock ?
5. What is characteristic of burn shock .
6. Specify the method of determining the area of the burn clinic .
7. Spend the burn surface treatment of burn shock .
8. Provide first aid to the patient with alkali burns .
9. What are the means to cleanse the wounds of necrosis .
- 10 . What used to dry necrotic eschar .

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

1. In the burn department patient P. 28 years old is admitted, who suffered burns boiling water 2:00 ago on 20 % of the surface area of the body. What period of burn disease of the victim ?

- A. toxemia
- B. shock
- C. shock and toxemia
- D septic
- E. convalescence

2 . In the burn department patient P. 28 years old is admitted,, who suffered burns boiling water 2:00 ago. The fired two upper limbs and hip. What is the area of the burn from the victim ?

- A. 55 %
- B. 25%
- C. 27%
- E. 35 %
- D.37%

3 . In the burn department patient, P. 25 years old is admitted, who suffered burns a flame to 2:00 , the victim fired two upper limbs and hip circularly circularly . What period of burn disease of the victim ?

- A. Toxemia
- B. shock
- C. shock and toxemia
- D , septic
- E. convalescence

4 . In the burn center patient appealed . Flame burn received 5 days ago , did not apply for medical aid , was treated independently. The patient fired left and right shin circularly epidemis missing dermis devitalized . Cold , nausea , chills, fever. What period of burn disease of the victim ?

- A. Toxemia
- B. shock
- C.shock and toxemia
- D , septic
- E. convalescence

5 . In the burn center delivered to the victim V., 28, with burns of the trunk and lower extremities. Injured three weeks ago , was treated at CRH. What period of burn disease of the victim ?

- A.Toxemia
- B. shock
- C. shock and toxemia
- D , septic

## E.convalescence

6. In the burn center delivered to the victim V., 28, with burns of the trunk and lower extremities circularly . Injured three weeks ago , was treated at CRH. What percentage of burns victim ?

- A. 20%
- B. 30 %
- C.36 %
- D. 45%
- E. 72 %

7. In the burn center delivered to the injured with burns on 30 % of the surface area of the body. Trauma got 2 an hour ago . What kind of therapy should appoint ?

- A detoxifying
- B. anty-shok
- S. hemostatic
- C. antibacterial
- D. desensebilisation

8. In the burn center of CRH brought a patient with a burn on the thigh area 5 % , injured 5 days ago in flames. Complaints of pain in wounds , temperature - 39 C0 perifocal of wounds. What kind of therapy should be assigned ?

- A. analgesic and anti shock
- B. detoxifying and hemostatic
- c. analgesic and desensitization
- D. detoxifying and antibacterial
- E. hemostatic .

9. In the burn center of CRH brought a patient with a burn on the thigh area 5 % , injured 5 days volume flame. Complaints of pain in wounds , temperature - 39 C0 perifocal of wounds. What are the means for the local treatment of wounds appropriate to have ?

- A region of 5% of wounds treated with tincture of iodine + aseptic bandage
- B. wound treated with a solution of hydrogen peroxide 3% + aseptic bandage
- C. necrolitic funds - 40 % salicylic acid
- D. wound-healing agents - actovegin , solcoseril
- E. hyperosmolar antiseptic ointment - miramistin , oflokain .

10 . A patient 48 years old flame burn both hands , the palms and the back of the hands are peeling and blistering epidermis filled with serous fluid . Forearms are not affected . What is the most reliable diagnosis ?

- A. Thermal burn Brush 1 - 2 degree
- B. Thermal burn brush degree 3b
- C. Thermal burn brush 2 - degree 3a

- D. Thermal burn brush 1 degree p
- E. Thermal burn brush 4 degree

11. Burn disease with chemical burns with a few exceptions :

- A. occurs in burns 1- 3st
- B. occurs in chemical burns of the esophagus and the stomach
- C. does not arise
- D. occurs in burns heavy metal salts

12. First aid for chemical burns of the esophagus and stomach :

- A. Multiple careful washing with water through a tube
- B. reception deep into " mash ", which consists of hydrocortisone
- C. bougieurage esophagus
- D. A converters lavage through a tube

### **Case studies for emerging knowledge**

1. In the burn center has addressed a patient who received a pin burn motorcycle exhaust pipes . Injury was 10 days ago . The wound in the leg in a dry , unresponsiveness necrotic eschar on the area of 1%. What are the means for the local treatment should be applied ?

2 . Emergency medical doctor who examined the child age 5 months , two hours after the injury, diagnosed: thermal burn boiling water II-III degree of the lower extremities , perineum , back to 20 ( , second degree burn shock . How will the amount of first aid?

3 . Parents are a child of 5 years to a doctor clinic with a diagnosis of burn back the I-II degree of up to 6 % of the first degree burn thigh to 5%. The child's condition of moderate severity. Which tactic is to elect a doctor?

4 . Chemical plant worker , working with corrosive , inadvertently poured it on his clothing , get a chemical burn right thigh and lower leg . After removing the clothes found: on the anterior surface of the inner right thigh , anterior surface of the right leg with the transition to the rear of the foot portions yellow - gray , sometimes snatches epidermis . Tactile and pain hypoesthesia affected skin . Where to start first aid to the victim ?

5 . Patient S. , 68 years old , she turned to a local doctor with complaints of pain and the presence of bubbles in the area of the left knee, which appeared after applying a compress with some solution. After inspecting the patient diagnosed as a chemical burn II - III degree . 2% cross section of the knee. What is the most purposeful organization - therapeutic tactics for this patient?

6. At the scene of the fire you inspected the affected male 36 years. Consciousness darkened , bloated face and hands , nose and lips burned . Breathing shallow , periodically marked cough, expectoration of sputum mixed with ashes . Your diagnosis ?

7. Pupil during a lesson of chemistry accidentally broke the flask with sulfuric acid. Urgent measures ?

8. In the burn center patient appealed A., 20 years old, who received a flame burn for 15 % of the surface area of the body II-III degree , the injury to 2:00 . For medical aid

did not address patient complains of pain in wounds , runny nose , chills , nausea , lack of urine. What is the treatment for it is expedient to appoint ?

9. On examination, the patient in the emergency department burn center revealed that the patient dressings on wounds, pus- soaked blue- green color. What antiseptics should be applied ?

10.The clinic patient appealed to burn right forearm II degree, the area burned 1%. The patient was conducted toilet burn surface with a solution of furacillinum 1:5000. What antiseptic should be applied for the topical treatment of this patient ?

11. The patient was 42 years of burn injury fire at the plant. The victim complains of a burning pain in the left upper extremity. On examination, the skin of his left hand from the wrist to the shoulder hyperemia , numerous bubbles of clear liquid . Where it is necessary to send the victim for treatment?

12. In the burn center patient appealed P., 45, with burns boiling water right hand , which was 3 days ago . The bandage was soaked thick purulent discharge . Which tools should be used ?

## **7. References:**

### **General:**

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- Library UMSA

<http://www.umsa.edu.ua/pidrozdilhome/biblioteca/biblhome.html>

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

At mastering topic number 18 to content module 4 for training activities for students rated a 4-point scale (traditional) scale, which is then converted into points as follows:

<b>rating</b>	<b>Points</b>
5 (excellent)	5
4 (good)	4
3 (satisfactory)	3
2 (poor)	0

Guidelines prepared

Associate Professor, Department of General Surgery

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