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INTERACTION OF POLICE OFFICERS WITH MEDICAL WORKERS IN PROVIDING PREMEDICAL CARE TO VICTIMS IN CASE OF THERMAL, ELECTRICAL, SOLAR AND CHEMICAL BURNS IN THE CONDITIONS OF THE ESTABLISHED MARTIAL LAW

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The paper considers an urgent problem - providing premedical care to victims in case of various burns by rescuers (police, specialists of emergency medical services and disaster medicine, the State Emergency Service, etc.) in the conditions of hostilities during the full-scale invasion of the aggressor country's troops.

The medical aspect of the concept of burns is revealed, their types (thermal, electric, chemical, solar) are characterized and the signs of the existing degrees of severity of the lesion depending on the depth of damage to human tissues are given. The procedure of providing premedical care by rescuers to victims of each of the above mentioned types of injuries is described.

Attention is paid to the peculiarities of transportation of victims with thermal burns: 1) compliance of the reception department, if possible, to the nature of the damage, especially in case of damage to the respiratory system or suspicion of serious or explosive injury; 2) the use, if possible, of air evacuation in case of remote location of the receiving department of the medical institution or if the victim's airways require surgical interventions that are not available at the pre-hospital level due to limited EMC capabilities; 3) immediate delivery of a person to the burn centre with an area of burns more than 10 % of the body and which are extended to the extremities, genitals, face and/or circular burns.

Taking into account the use of phosphorous bombs by aircraft of RF in the conditions of full-scale war on the territory of Ukraine, the peculiarities of chemical burns due to the action of white phosphorus on the human body are considered, and the algorithm of premedical care to victims of these lesions is revealed.

Emphasis is placed on the need to comply with contraindications in providing premedical care to victims of burns (it is strictly forbidden to use ice, oil, flour, aloe juice and other folk remedies; apply gels, ointments, creams, alcohol-based drugs to the wound for pain relief etc.)

Keywords: *rescuers, police, burns and their types, severity of damage, victims, assessment of the victim state, premedical care, algorithm of rescue operations, features of transportation, contraindications, martial law*

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1. Introduction

The urgency of the problem is primarily due to the fact that from February 24, 2022 – the beginning of the aggressive hostilities of the Russian Federation (aggressor country – specified by the authors) in Ukraine – the enemy forces missile and artillery shelling in Ukrainian settlements every day, occupying aircraft carries out destructive bombing of residential neighborhoods and industrial areas, killing and injuring civilians. Unprovoked invasion of Russian troops led to the introduction of martial law in Ukraine [1]. During the explosions and fires that often occur after such shelling, it is easy to get burns for both rescue workers and local residents (property owners). Therefore, employees of the SES, specialists of the emergency medical care brigade (hereinafter – EMC), police and others. Citizens must be well aware of the procedure for providing premedical care and be able to perform basic algorithms for dealing with various injuries to victims, including when they receive thermal and other types of burns. Rescuers should also keep in mind the existing contraindications to emergency medical care, which in any case can not be done in these cases [2, 3].

2. Literary review

Issues of providing premedical care for victims are multifaceted – should be considered as the capabilities of the rescuer at the scene (medical staff of the emergency medical team; persons without medical education, but who by their responsibilities are obliged to provide premedical care (police, SES em-

ployees, drivers, etc.); ordinary citizens, etc.), as well as the peculiarities of the place and potential factors of damage (at work, in hostilities, at home, etc.). In the current conditions of the aggressor country's full-scale war on the territory of Ukraine, when the occupying forces use, in particular, phosphorus bombs and highly toxic substances against the Ukrainian military and civilians, sabotage chemical plants, etc., it is important for any category of rescuers to properly understand the procedure for providing premedical care for burns that occur due to fires, exposure to chemicals and other dangerous factors on the human body.

Scientists and practitioners of the medical and law enforcement industries in various types of publications cover issues, related to the training of skills in providing premedical care to target categories of students, describe the algorithms of rescuers. Thus, Taras Stepanovych Vaida in the textbook "Medical care" considers the features of different types of burns (chemical, radiation, solar), as well as the procedure for providing medical care to victims [4]. The hazardous factors, described by scientists, are limited to a list of the most common chemicals and radiation substances, used in industrial and premedical conditions.

In the educational and practical manual "Personal Security" [5], prepared by a team of authors (Vladimir Oleksiyovych Kryvolapchuk, Ivan Mikhailovich Todurov, etc.) medical training of police officers is given a separate section. However, on the issues of providing premedical care to victims of burns, scientists have considered mainly general approaches to the organization of rescue operations depending on the degree of damage to the body without specifying the effects of different types of chemicals.

Volodymyr Dmytrovych Shyschuk, Vladyslav Anatoliyovych Smiyanov and Karina Andronikova Rudnikova in the textbook "Medical care in emergencies" in a separate section of this work pay attention to the rules of premedical care for victims of burns in various extreme conditions, and the specification of dangerous factors of the scene that lead to burns, is not given [6].

Elena Vitalievna Chuprina, Taras Petrovich Zhilin in the publication "Premedical care" [7] consider premedical care for burns as a separate issue in the topic "Premedical care in case of injuries" among other types of lesions (mechanical injuries, bleeding, bandaging techniques, poisoning), distinguishing thermal effects (overheating, heat stroke, hypothermia (frostbite) among the burns, received by victims due to exposure to electric current or radiation.

In general, in the above works there is no comprehensive approach to the medical aspect of police training, taking into account the peculiarities of their premedical care for victims of hostilities – the specifics of human damage by phosphorus bombs is not revealed, insufficient scientists' attention is paid to the issues of the action of this type of substance (white phosphorus - specified by the author); aspects of emergency medicine, such as the organization of sorting victims of mass injuries in the aftermath of shelling and bombing, fires, are not considered, the possibility of rescuers to help a person in the absence of medical supplies, dressings, etc. is not analyzed.

Not only premedical scientists, but also foreign researchers dedicate their works to the issue of providing home medical care to victims, in particular, in combat conditions. Thus, B. J. Eastridge, M. Hardin, J. Cantrell in their article "Died of wounds on the battlefield: causation and implications for improving combat casualty care" [8] analyze common causes of death of wounded on the battlefield, consider algorithms for assisting servicemen in various injuries. However, the authors consider only the dangers, arising from gunshot wounds, bypassing such aspects as the destruction of servicemen by chemical weapons.

Eric A. Elster, Frank K. Butler, Todd E. Rasmussen in the work "Implications of Combat Casualty Care for Mass Casualty Events" systematize approaches to providing assistance to victims of hostilities in mass casualties, highlight the features of premedical care in the sectors of shelling, shelter and a field hospital. At the same time, no attention is paid to protection and assistance to the civilian population [9].

J. Morrison, J. Oh, J. Dubose [et al] in "En-route care capability from the point of injury mortality after severe wartime injury" consider the possibility of providing assistance to servicemen during their transportation due to their severe injuries in combat actions [10]. B. Gegel, J. Burgert, J. Gasko [et al] in the article "The effects of QuikClot and Combat Gauze and movement of hemorrhage control in a porcine model" consider the issue of stopping bleeding from critical injuries, suggest to use modern medical means and methods of transportation of victims [11]. The above-mentioned authors take into account only the dangerous factors of combat weapons and the provision of assistance due to injuries (critical bleeding, broken bones, transportation of the victim in various ways by one or more rescuers). In the absence of other dangerous factors (thermal, chemical, radiation), the provision of this type of premedical care was not considered by these scientists.

Despite the fact that enough premedical and foreign work is devoted to the development of premedical care for victims of burns, it should be noted, that the current premedical medical and technological documents for standardization of emergency care [12] do not contain a specific algorithm for rescuers in this regard, taking into account features of the dangerous factors of martial law, they (clinical protocols EMC – specified by the author) only determine specific approaches to the provision of premedical care on the basis of standard actions in peacetime. Thus, not all of the algorithms of rescuers' actions, given in these standards of the Ministry of Health of Ukraine, should be considered exhaustive for providing EMC in wartime.

In this regard, in our opinion, there is a need to specify the procedures for rescuers (law enforcement officers in conjunction with medical workers) for premedical care for victims when the aggressor country uses new weapons of war, which will be useful and effective in new extreme martial law.

3. Research aim and tasks

The aim of the study is to reveal the interaction of rescuers (police, medical staff, SES specialists, etc.) in providing premedical care to victims of various types of burns in martial law.

To achieve this goal, the following tasks were set:

- 1) to clarify the concept of burns and characterize its types, to determine the signs (symptoms) of the lesion depending on the depth of damage to human tissues;
- 2) to reveal the procedure for providing premedical care depending on its type (thermal, electrical, chemical, solar);
- 3) to pay increased attention to the peculiarities of the damage to the human body due to the action of white phosphorus as a component of the corresponding type of bombs of the aggressor country;
- 4) to specify the contraindications that must be taken into account by rescuers when providing assistance to victims of burns.

4. Materials and methods

In preparing the scientific article we used the following textbooks and regulations:

- 1) medical and technological documents of the Ministry of Health of Ukraine on the standardization of emergency medical care and other regulations, in particular, on the powers of the police in this area in the conduct of combat operations [2, 3, 12];
- 2) prompt publications of Internet editions, covering the results of hostilities on the territory of Ukraine by the Russian Federation since February 24, 2022 (in terms of destruction of infrastructure of settlements in many regions of the Ukrainian state, widespread injuries from rocket and artillery shelling, use of phosphorus bombs, chemical attacks, etc. by the country – aggressor) [13–15];
- 3) author's manuals and reference publications in terms of providing pre-medical/premedical care to victims by rescuers (police) [4, 16, 17].

The following set of scientific methods was used in the process of solving the set tasks: critical analysis of operative media publications on coverage of hostilities in Ukraine, their impact on the destruction of infrastructure and the state of life and health of citizens. Generalization of methods of providing premedical care for burns, which are described in the professional medical literature and defined by current regulations as appropriate algorithms for dealing with these injuries. Synthesis of knowledge in medicine, law enforcement, related to the study of the research object, their systematization. These methods made it possible to multilaterally consider and justify the procedure for providing premedical care for victims of various types of burns by police with other rescuers.

5. Research results and discussion

The interaction of police officers and specialists of EMC units in providing premedical care to victims means is interpreted by us as such joint activities of law enforcement and medical officers, in which the result of one of the subjects affects the other, which changes their dynamic behavior and the effectiveness of rescue measures for injuries (in our case thermal – *specified*) of victims. Among the main typical forms of such interaction between the police and the EMC team in providing premedical care to victims, it is advisable to highlight the following:

- 1) informing (first on the scene) the dispatcher of the call reception of the operational dispatch service of the EMC and Disaster Medicine Center by the police about the event, which (dispatcher – specified by us) determines the condition of the victim (s) (signs of life, injury, etc.) and the circumstances of the call (number of injured/dead, their gender, age, types of wounds, access of specialized ambulances, other important characteristics) for proper preparing/equipping of the EMC team with medical devices before departure and further effective (qualified) premedical care upon arrival at the specified address;
- 2) ensuring for the victim/s safety and their maintenance of life until the arrival of the EMC team (cessation of dangerous factors on the person, artificial lung ventilation, indirect heart massage, etc.) by the militiaman;
- 3) setting/staying the police officer in contact with the specialists of the EMC team during their transfer to the scene, informing about the change in the state of life of the victim/s; receiving, if necessary, operational consultations in case of deterioration of their condition;
- 4) restricting the access of outsiders by the police, fencing the scene, involving (if necessary) those present (witnesses of the accident) to provide all possible assistance to the victim; clarifying the conditions and causes of injury, organizing persons to meet the EMC team/attract attention the driver of the

special vehicle for his/her operative orientation on the terrain (indicate the optimal direction of the entrance);

5) use by the militiaman of the available medical means of a police first-aid kit for carrying out rescue operations (home medical care); direct additional informing of ambulance specialists after their arrival at the scene; providing safety during their work, providing them with assistance in medical sorting of victims in case of mass injury, documenting the necessary information, etc.;

6) taking measures by the police officer to stop panic (if necessary), in particular, in the event of a mass injury; in the absence of the required number of special vehicles the EMC team attracts oncoming/passing transport to transfer victims to medical institutions, establishes and maintains communication with the reception department, etc.

Let's consider the peculiarities of providing premedical care for victims by the police/specialists of the EMC unit at the scene in the presence of each of the types of burns separately.

Burns are damage to the soft tissues of the body due to high temperatures, chemicals, electricity or sunlight. Accordingly, burns are: thermal, chemical, electrical and solar [4, p. 490–491].

The severity of burns depends on the following factors:

- 1) the factor that caused the damage;
- 2) location of the lesion on the body;
- 3) volume (area of damage) on the body;
- 4) the age of the victim;
- 5) his/her state of health.

Also very important is the time, during which the harmful factor affected the skin.

According to the depth of tissue damage, burns can be divided into superficial, moderately deep and deep, in medical practice it corresponds to burns of the I, II and III-IV degrees, respectively. Superficial burns are characterized by reddening of the skin, moderate-deep – the appearance of blisters, deep – charring of the skin and damage to the lower layers of tissue [12].

At I degree of burns only the top layer of integuments is damaged. The burn is accompanied by redness, swelling, pain. The victim may have a local increase in body temperature, moderate pain. At II degree of burns deeper layers of epidermis are destroyed. The burn is accompanied by the appearance of blisters, filled with fluid. At III degree of burns skin covers are deeply damaged. Sometimes the subcutaneous tissue suffers. The burn is accompanied by tissue necrosis, so the wound may be dark or even black. In case of burns there may be a dry scab. In IV degree burns, the skin is charred, muscles and even bones are affected, and unbearable pain is characteristic. The wound is covered with a dark gray scab due to tissue necrosis [4, p. 494–495]. In any burn, cooling the wound helps to prevent the formation of blisters in case of its (wound – specified by the authors) small size and reduce tissue damage deep into the body in more serious lesions.

The purpose of providing premedical care for burns is to minimize tissue damage and avoid further severe morbidity due to their receipt.

The victim of high temperature may have the following symptoms:

- a) lesions of the respiratory tract – stridor, hoarse voice;
- b) damage to the mouth and nostrils – redness, blisters, soot, burnt hair;
- c) impaired breathing – fast, shallow, wheezing;
- d) injured skin – the total area of burns and depth (partial or complete);
- e) burns of the body may be accompanied by other injuries, associated with them – damage to certain organs or parts of the body due to explosion, fall, attack, etc. [12].

If the above symptoms are detected in a victim with thermal burns, the rescuer should immediately begin to provide premedical care and/or transport the person to a medical institution. Electrical, chemical and radiation burns require a different specific approach to premedical care (see Toxins and the Environment section of the pre-hospital EMC clinical protocol) [12].

Features of transportation of victims with thermal burns are as follows:

- 1) these persons must be transported to the most appropriate (specialized) reception department in case of damage to the respiratory system or on suspicion of serious or explosive injury;
- 2) be aware of the possibility of using air evacuation in case of remote location of the reception department of a medical institution or if airway control requires surgical interventions that are not available at the pre-hospital level of EMC;
- 3) should be transported immediately to the burn center in the presence of shallow or deep burns of more than 10 % of the body, which extend to the limbs, genitals, face and/or circular burns.

First of all, a police officer (rescuer of the State Emergency Service, EMC brigade employee, etc.) at the scene must check the availability of safe conditions for him/herself or the victim during further premedical care. In order to ensure the personal safety (of EMC teams, etc. and of the victim), it is necessary to check:

- a) switching off the power source;
- b) integrity of the power line (not broken, not damaged by fire, etc.);
- c) the gas source is blocked;

- d) absence of secondary fire devices;
- e) possible presence of harmful substances;
- e) it may be necessary to use special protective equipment, including breathing apparatus [12].

When assessing the condition of the victim with symptoms of thermal burns, the rescuer (for greater efficiency – in conjunction with the staff of the EMC team) must pay attention to the following aspects:

1) the causes of the event – it is advisable to further consider such factors as: a) the relationship of burns with other injuries; b) inhalation of such hazardous chemicals as CO and cyanide; c) violence against children or the elderly;

2) follow the ABC algorithm during resuscitation (according to the guidelines "General trauma" of the clinical protocol of EMC at the pre-hospital stage) [12];

3) in the presence of burns of the respiratory tract to carry out aggressive control of the respiratory tract;

4) keep the spine at rest in the presence of signs, indicating trauma (according to the guidelines "Assistance in spinal trauma" of the clinical protocol of EMC at the pre-hospital stage) [12];

5) estimate the total area of burns and their depth, to do this: a) apply the rule of "nine" (see the table of burns in Annex 2 of the clinical protocol of EMC at the pre-hospital stage) [12]; b) first-degree burns (skin erythema only) should not be included in the calculation of the total area of burns;

6) apply the scale of pain [12].

Consider the general requirements for premedical care for burns.

First you need to eliminate the cause of the burn (stop the burning process, the action of the damaging factor):

1) remove wet clothing, soaked in hot liquid, (if it has not stuck to the victim) or clothing that is still burning or already burnt, remove all jewelry on the body near the burn. If clothes or other things stick to the burnt skin, they should not be touched - you just need to cut the clothes around the burn site, and leave the damaged area without intervention;

2) remove the chemical from the skin surface;

3) turn off the electric current;

4) prevent further exposure to sunlight.

The burn site needs immediate cooling:

1) you can reduce the temperature of the damaged surface with cold water for 10 minutes by immersing it (damaged surface – we specified) in water or watering this surface, or apply a cold compress – it will reduce the feeling of pain;

2) in case of violation of the integrity of the skin, cool down after covering the burn area with a napkin. But you do not need to apply ice! If the victim's body temperature has dropped to 35 °C, it is impossible to cool [12].

Remove any items around the burn site:

1) if possible, remove the jewelry (wedding rings, watches and other items) from the affected limb before the swelling appears;

2) do not touch the blisters.

Isolate the affected area on the body to minimize microbial contamination of the burned area:

1) cover the deeply affected area of the body with a clean damp cloth, dry bandages or clean sheets to prevent further infection of the burn wound;

2) reassure the victim;

3) do not use gels or ointments [13].

The first aid kit must have anti-burn bandages - they are the best to use: first the protective film is removed from one side of the bandage, then the bandage is applied to the wound and the film is removed on the other side. Then you need to fix the bandage with a belt or adhesive tape on the skin. Such special bandages cool the burn site, reduce the likelihood of blisters (if the burn is not more than 1 degree), protect the wound from infection and mechanical friction.

If you do not have an anti-burn bandage, you can apply a sterile gauze bandage or a piece of clean cloth to the burn site. This will help protect the affected area. But do not apply ointments, vegetable oils or spray to the damaged area! Ibuprofen or paracetamol will help relieve pain. If a person has burns to the eyes or face, then the person should be sat, not laid – sitting position will help reduce swelling.

If you have a pulse oximeter, check the victim's saturation (oxygen saturation – we specified), and then report this information to doctors. It is urgent to call an ambulance (103) if: 1) the child's burns are from 5 % of the body and more; 2) in an adult – from 10 % of the body and more; 3) burnt areas of skin around the eyes, face and affected respiratory tract [4, p. 489–521; 12; 16, p. 199; 17, p. 32].

The victim of burns should be covered with a blanket or warm clothes, his/her body cools down very quickly. You also need to give painkillers (ibuprofen or paracetamol). Until the ambulance arrives, the victim with a large area of burns on the body should be covered with a blanket/duvet or warm clothing to avoid rapid hypothermia.

Healthcare professionals can monitor SpO₂ (the level of oxygen saturation is the percentage of hemoglobin, saturated with oxygen; in other words, it is the amount of oxygen in the blood, an important indicator of the human respiratory system), ETCO₂ (carbon dioxide concentration at the end of a quiet exhalation), heart rate – if available, use a carboxyhemoglobin monitor. If necessary, conduct high-flow oxygen therapy to all victims who were indoors. When receiving intravenous access, manipulations in the burn area should be avoided; assess the presence of distal circulation in girdle burns of the extremities; carry out early anesthesia and use antiemetics.

Then, as a rule, medical professionals begin liquid resuscitation - administer a combined drug with a composition of sodium chloride + potassium chloride + sodium lactate + calcium chloride or isotonic saline:

a) in the presence of shock – consider other causes, such as trauma or cyanide poisoning (conduct infusion therapy according to the instructions "Shock") [12];

b) in the absence of shock – start infusion therapy based on the total area of burns (see Annex 2 of the clinical protocol of EMC at the pre-hospital stage) [12]; children, weighing less than 40 kg, need the use of auxiliary devices for measuring weight (determination of weight by height);

c) if a person weighs more than 40 kg, the primary bolus can be calculated due to the rule "10" – determine the total area of burns (round to the nearest ten); multiply the area by 10 = primary bolus (ml/h) (for a person, weighing 40–80 kg); add 100 mg/kg for every 10 kg if the victim weighs more than 80 kg [12].

Systematic heat loss should also be avoided (keep the injured person warm at all times).

Rescuers and victims must consult a doctor if:

1) children under the age of 5 or adults over the age of 60 were affected by the burn;

2) the face, ears, neck, arms, feet, joints and genitals were affected by the burn;

3) there was a burn of the respiratory tract (inhalation of smoke or hot gases);

4) deep burns;

5) burns, caused by electric current, chemicals, steam under high pressure;

6) burns affected more than 5 % of the skin of a child under 16 years of age and more than 10 % of the skin area of an adult.

To estimate the size of the burn area, it is advisable to use the "rule of the palm": the palm of the victim together with the fingers is 1 % of the skin of the body of this person.

In case of an explosive injury, care should be provided in accordance with the guidelines "Explosion injuries" of the EMC clinical protocol at the pre-hospital stage [12].

Respiratory burns can quickly lead to upper airway obstruction and respiratory failure. Therefore, there is a need to maintain a high level of suspicion of cyanide poisoning in victims with a low point of the Glasgow Coma Scale (GCS), respiratory problems and cardiovascular collapse after being indoors. In such situations it is necessary to administer an antidote (hydroxocobalamin).

Especially in fires in confined spaces, it is advisable to suspect the possibility of carbon monoxide poisoning, and therefore pulse oximetry may not be accurate (see the manual "Smoke/carbon monoxide poisoning" of the clinical protocol of EMC at the pre-hospital stage [12]). In the presence of a specific substance (cyanide, fluoric acid, other acids and alkalis), premedical care for burns is carried out in accordance with the guidelines "Local chemical burns" of the clinical protocol of EMC at the pre-hospital stage [12]. It is advisable to consider the issue of decontamination of the victim and notify the admission department of the medical institution about the reception of a potentially infected person (for example, the case of burns and poisoning in the amphetamine laboratory).

When providing premedical care for burns, it is advisable to pay attention to the following aspects:

1) the appearance of stridor and changes in voice are signal signs of potential burns of the respiratory tract, which can quickly lead to obstruction or respiratory failure;

2) if the victim is in a state of shock within the first hour after the injury, the cause of the shock is not burns - it is necessary to examine the victim to identify traumas or cyanide poisoning;

3) in the absence of shock, the above volumes of fluids will be quite adequate to maintain the level of fluids in the body of the victim;

4) pain control in the injured person is very important in conditions of severe burns;

5) ETSO₂ monitoring may be useful for monitoring the respiratory status of victims, receiving high doses of narcotic analgesics;

6) monitoring of heart rhythms is especially important for electric burns and chemical inhalation injuries;

7) the area of burns is determined only for burns of the second and third degrees – burns of the first degree are not taken into account [12, 13].

Consider the features of premedical care for other types of burns.

Chemical burns. If this type of burn is caused by a dry chemical, it should be shaken off, not forgetting the personal safety of the rescuer, and then provide premedical care, as in case of thermal burns.

The chemical liquid is washed off with plenty of running water for 10–15 minutes. If the chemical gets into the eye, it must be rinsed under running water. At the same time, the damaged eye must be lower than the healthy one, otherwise the other eye can be damaged [13].

As the Russian military is cynically bombing Ukraine with phosphorus bombs (for example, on the front line near Avdiivka в Kramatorsk (Donetsk region), Rubizhne and Popasna (Luhansk region), Irpin and Gostomel (Kyiv region), Kryvyi Rih district settlements of Dnipropetrovsk region, etc., March 2022) [14], that is, the probability of human exposure to white phosphorus. Therefore, the effect of this substance on the human body should be considered.

Phosphorus bombs are munitions, filled with white phosphorus. This is a flammable self-igniting substance that is easily ignited by contact with oxygen. Its combustion temperature is about 800 °C.

Upon contact with human skin, white phosphorus causes severe chemical burns, up to bone and bone marrow damage, and tissue death. This substance ignites spontaneously in contact with oxygen (air). When it gets on the skin or clothes, phosphorus sticks to them and continues to burn. The lethal dose for a person is 0.05–0.15 g. Thus, the body receives not just burns, but deep wounds.

It should be noted, that the use of phosphorus bombs is prohibited by the Geneva Convention relative to the Protection of Victims of War (Protocol of 1977) and the Convention on Certain Conventional Weapons [14].

Premedical care for phosphorus burns consists in the rescuer's observance of the established safety measures and application of the following actions:

- 1) do not touch the phosphorus particles on the skin or clothes with your hands;
- 2) if possible, immerse the damaged part of the body in water or you need to abundantly rinse or moisten the skin and clothing with water where there are drops of phosphorus;
- 3) carefully remove clothing, preferably directly in water or continuing to rinse it (phosphorus does not burn in water); for convenience, you can use tweezers or something at hand, which can remove phosphorus and burnt parts of clothing;
- 4) treat the wound with soda solution in the proportion of 1 teaspoon to 1 cup of water;
- 5) apply a wet bandage to the wound, preferably moistened with soda solution;
- 6) do not use cotton wool (lint sticks to a wet wound, can also catch fire) and hydrogen peroxide (when hydrogen peroxide decomposes, water and oxygen are formed, which causes phosphorus to ignite);
- 7) if the victim is conscious, it is possible to give him/her any available painkillers and sedatives;
- 8) when burning phosphorus also emits toxic fumes, so to avoid poisoning by vapors of phosphorus compounds and the removal of these toxic substances, any sorbent inside is suitable – white coal, enterogel, atoxyl, etc.;
- 9) give the victim a lot of water to drink – you can give milk and alkaline still water to the victim [12, 14, 15].

Electric burns. Premedical care in this case is to perform the following algorithm of rescue operations: 1) apply a dry napkin to the burn; 2) call an ambulance; 3) monitor the condition of the victim (the person may have problems with heart activity) [4, p. 489–521].

Sunburns. This type of burn is the most common injury in the summer. Sunburns, unlike thermal burns, are not divided into different degrees (they are usually always superficial). In the mild degree of the burn, the skin turns red, itching occurs, and in severe – blisters with transparent contents are formed. However, the danger of such burns is not in its depth, but in the area, occupied by the lesion. For example, sunbathers on the beach can burn up to 90–95 % of the total body area. The signs of sunburn appear only after 8–12 hours, and exfoliation of the affected skin begins on the fourth or seventh day.

The severity of symptoms in this case depends primarily on the type of human skin – the more light-sensitive it is, the more extensive and dangerous the burns. Also among the influencing factors on the burn degree are the geographical location and length of stay of the victim in the sun.

Premedical care for sunburns. In most cases, the victim may need medical attention if more than 50 % of the body is burned, as well as with severe symptoms – fever, chills, headaches. In this situation, it is not necessary to postpone a visit to a medical specialist, as sun stroke can occur along with sunburn. In other cases, you can use the general recommendations for people who have experienced sunburn.

First of all, after the onset of the first symptoms of sunburn, the victim should cool his/her skin, reduce itching and pain – the person can take a cooling bath or shower. Then apply compresses to the affected areas of the skin – for example, a towel, soaked in cold running water. In addition, the victim can use drugs from the pharmacy, which alleviate the symptoms of burns. All drugs can be divided into several groups:

- 1) drugs with steroid hormones: they are designed to quickly relieve itching and inflammation, and if used for a short time, they are completely safe;
- 2) antihistamines: these non-hormonal drugs suppress the release of "inflammatory mediators" that cause swelling and pain/burning at the burn site; quickly relieve itching, inflammation;
- 3) local painkillers: they have an analgesic effect;
- 4) antiseptics: will help if blisters have formed (the infection will not penetrate the skin and will not cause further damage);
- 5) dexpanthenol: it is used to make a large number of drugs in the form of ointments, gels, foams and sprays (with their help you can quickly reduce the inflammatory process and accelerate skin regeneration);

6) healing drugs: most often such drugs are used not to relieve primary symptoms, but for faster healing of damaged skin [4, p. 500–503].

Various non-steroidal anti-inflammatory drugs – paracetamol, ibuprofen – will also help to alleviate the general condition of the victim of sunburn. The victim should drink more water and wear light and loose clothing. Under no circumstances should you injure your skin with oils and cosmetic creams, as this will only provoke inflammation. It is also not advisable to use well-known folk remedies – butter or sour cream, because fat retains heat inside the affected area of the body, and does not contribute to its removal and cooling of the skin. The same applies to alcohol solutions – they delay the process of skin regeneration [13; 15].

When blisters appear, you do not need to break their integrity on your own. The victim must also refrain from exposure to direct sunlight for several days; do not use scrubs to exfoliate the skin, because they will only damage it (the skin – we specified) and the wound will be infected.

Tissue burns from radiation damage are usually detected in the late stages after irradiation, i.e. this is not a priority for EMC (if burns occur abruptly, they are due to a thermal or chemical mechanism). Late symptoms (days or weeks after exposure or infection) in the form of skin burns or erythema indicate direct contact of the victim with a radioactive source or due to exposure to ionizing radiation [12].

Special warnings for burns. It is important to keep in mind the existing strict limits on certain incorrect rescue operations for burns. In case of thermal burns, the following actions should not be taken in any case:

1) use ice for cooling (promotes hypothermia), as well as butter, sour cream, flour, aloe juice and other means of "folk medicine";

2) tear off clothes that have stuck to the burn wound;

3) destroy the integrity of burn blisters;

4) use cotton wool for bandages;

5) apply cosmetic creams, gels, ointments, scrubs, powders, especially alcohol-based preparations (alcohol dries the skin even more and intensifies the pain of burns).

Only a special anti-burn bandage or cold compress should be applied to the wound. Specially designed means for burns are applied only after cooling the affected burn area [4, p. 503–510].

If blisters appear on the skin, you should never pierce them yourself. It is also important for the rescuer to know to what degree the burn can be attributed and what to do with chemical burns as the most dangerous. In addition to actions to provide premedical care to victims of severe burns, it is important to be able to apply a tourniquet and stop bleeding [15].

Key elements of the documentation (for medical workers), in which it is necessary to note the following in case of burns:

1) the primary status of the victim's respiratory tract;

2) the total amount of received infusion therapy;

3) body surface area, covered with second and third degree burns;

4) assessment of pulse and capillary filling in the presence of girdle burns of the extremities;

5) documentation of pain on the scale of pain and analgesia [12].

Criteria for the effectiveness of premedical care for burns are as follows:

1) transportation of the victim to the most appropriate (taking into account the specifics of the injury) reception department of the medical institution, preferably in a specialized burn center;

2) operative documentation of the victim's pain on the pain scale and prescribed appropriate treatment;

3) correct recording of the results of examination and control of the respiratory tract [12].

6. Conclusions

Having analyzed the requirements of regulations in the field of EMC, the description of ways to provide premedical care to victims in the special educational and methodological literature as well as modern Internet resources on the issue, we can make the following generalizations.

1. As a result of hostilities (stay in the area of shelling or bombing during the occupation), victims may receive burns due to high temperature, electric shock, chemical burns to the skin and respiratory tract. If you do not observe safe working or outdoor conditions in the summer, sunburns also occur. Burns refer to damage to the soft tissues of the body due to high temperatures, chemicals, electric current or sunlight. Accordingly, burns are: thermal, chemical, electrical and solar.

The main symptoms of burns in the respiratory tract are stridor, hoarse voice; with damage to the mouth and nostrils – redness, blisters, soot, burnt hair; in case of respiratory disorders – rapid, superficial, wheezing respiratory excursions of the chest; with injured skin – the total area of burns and depth (partial or complete); body burns may be accompanied by other injuries, associated with them.

Police officers together with medical staff or SES staff must know and be able to competently provide premedical care to victims depending on the type of burns and the degree (depth) of damage to the body of the injured person.

2. The procedure for providing premedical care depending on its type (thermal, electrical, chemical, solar) is the following actions of the rescuer:

- 1) eliminate the cause of burns (stop the action of a dangerous factor), ensure the safety of the victim and rescuer;
- 2) immediately cool the burns;
- 3) remove things (clothes) around the burn site, isolate the affected area on the body to minimize microbial contamination of the burned area;
- 4) apply anti-burn bandages;
- 5) check the victim's saturation;
- 6) cover with a blanket/warm clothes.

Due to various aggravating circumstances at the scene, hazards can determine the special procedure for providing premedical care depending on the depth of the airway, nasopharynx or skin surface area damage with high temperature gases or electric current, as well as acids or alkalis.

3. Of particular concern from the point of view of health hazards are chemical burns, in particular, due to the impact of white phosphorus on the victim during the bombing of settlements in Ukraine with phosphorus bombs by Russian aircraft at martial law. Premedical care is to use such rescue measures as:

- 1) avoid contact with phosphorus particles;
- 2) immerse the damaged part of the body in water/abundantly rinse or moisten the skin and clothes with drops of phosphorus;
- 3) take off clothes;
- 4) treat the wound with soda solution in a certain proportion;
- 5) apply a wet bandage to the wound, preferably moistened with soda solution;
- 6) if the victim is conscious, give him/her painkillers and sedatives;
- 7) to avoid phosphorus vapor poisoning and excretion of these toxic substances from the body, apply a sorbent orally (white coal, enterosgel, atoxyl, etc.);
- 8) give the victim plenty of water to drink, including milk and alkaline still water.

The rescuer's knowledge of the algorithm of correct actions in providing premedical care to the victim with these burns will contribute to the rapid and effective rescue of life and health of citizens.

4. The main contraindications that must be taken into account by rescuers when providing assistance to victims of burns are the following:

- 1) do not spend time on assistance at the scene in the presence of deep burns of more than 10 % of the body, which are on limbs, genitals, face and/or circular burns;
- 2) do not use cotton wool and hydrogen peroxide in the treatment of phosphorus wounds;
- 3) remove all things/jewelry that are on the body near the burn, until the swelling of the limb;
- 4) do not touch clothes or other things that have stuck to burnt skin;
- 5) do not apply gels or ointments to the burn;
- 6) to avoid hypothermia, the victim of burns should be covered with a thermal insulation blanket or warm clothing.

Conflicts of interest

The authors declare that they have no conflicts of interest.

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