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AND INTERNAL DISEASES

THE FIRST AID IN THE CASE OF NON-EPIDEMIC DISEASES

STUDY GUIDE

for 6th-years students of international faculty
speciality «Medicine», «Pediatrics»

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Study guide compiled in accordance with the program of «General practice - family medicine». Guidelines are intended to help students prepare for practical classes and learn the material. Can be used for training of 6th-years students of international faculty, discipline «General practice - family medicine».

Михайловська Н. С.

Перша допомога у випадку неепідемічних захворювань: навчальний посібник до практичних занять та самостійної роботи студентів VI курсу міжнародного факультету (спеціальність «Медицина», «Педіатрія») з дисципліни «Загальна практика - сімейна медицина» / Н. С. Михайловська, Г. В. Грицай, Я.М. Михайловський – Запоріжжя: ЗДМУ, 2023. – 104с.

Навчальний посібник складений відповідно до програми «Загальна практика - сімейна медицина». Видання має на меті сприяти кращому засвоєнню теоретичних знань студентами під час підготовки до практичних занять. Посібник рекомендований для використання студентами VI курсу міжнародного факультету з дисципліни «Загальна практика - сімейна медицина».

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CONTENT

PREFACE

Emergency conditions that threaten the life and health of the patient require immediate help at all stages of medical care. The development of emergency conditions due to acute disorders of vital organs and systems is possible in many diseases. These conditions arise from the development of shock, acute blood loss, respiratory distress, circulatory disorders, coma, which are caused by acute diseases of internal organs, traumatic injuries, poisonings and accidents.

The relevance of the study of emergency conditions is associated with a high incidence of diseases and conditions requiring emergency medical care in the practice of the family doctor, a variety of nosological forms and the complexity of their diagnosis and treatment, with the need to use special methods and special readiness of medical institutions and medical personnel to provide appropriate help, because the life of the patient depends on this, with the need for accurate diagnosis in the shortest possible time and, based on from the alleged diagnosis, the definition of therapeutic tactics.

This textbook is composed according the requirements of typical working program and working program of academic discipline «General practice – family medicine», speciality 222 «Medicine», 228 «Pediatrics». The necessity of this textbook is grounded by absence of such workbooks, which satisfy requirements of basic parts of academic discipline «General practice – family medicine».

The cover image was downloaded from website https://www.kingstonfirst.co.uk/portfolio-item/training-first-aid-level-2-award-in-emergency-first-aid-at-work/.

The purpose of this textbook is acquiring of knowledge and practical skills of 6th-years students during preparation for classes and final module control.

EMERGENCY IN THE CASE OF PAIN SYNDROME IN THE PRACTICE OF FAMILY DOCTOR

I. Theme actuality. The task of medicine is to preserve and restore health and to relieve suffering. Understanding pain is essential to both these goals. Because pain is universally understood as a signal of disease, it is the most common symptom that brings a patient to a physician's attention. The function of the pain sensory system is to detect, localize, and identify tissue-damaging processes. Since different diseases produce characteristic patterns of tissue damage, the quality, time course, and location of a patient's pain complaint and the location of tenderness provide important diagnostic clues and are used to evaluate the response to treatment.

II. Study purposes: to evaluate the patient and to provide medical care in the case of pain syndrome. To know the algorithms of primary health care.Toknow the principles of interrelation with secondary and tertiary health care setting.

III. The practical skills: to differentiate acute and chronic pain, somatic and psychosomatic pain. To diagnose the pain syndrome in different clinical cases, its treatment. The algorithm in the case of acute coronary syndrome at the pre-admission stage. The diagnostics and emergency in the case of abdominal pain.The treatment of acute arterial occlusion.

IV. The basic terms and notions, which have to be known by students:

A **migraine** is a primary headache disorder characterized by recurrent headaches that are moderate to severe. Typically, the headaches affect one half of the head, are pulsating in nature, and last from two to 72 hours. Associated symptoms may include nausea, vomiting, and sensitivity to light, sound, or smell. The pain is generally made worse by physical activity.

Acute coronary syndrome is a syndrome (set of signs and symptoms) due to decreased blood flow in the coronary arteries such that part of the heart muscle is unable to function properly or dies. The most common symptom is chest pain, often radiating to the left shoulder or angle of the jaw, crushing, central and

associated with nausea and sweating. However, many patients with acute coronary syndromes present with other symptoms than chest pain, particularly, women, older patients, and patients with diabetes mellitus. Acute coronary syndrome is usually caused by one of three problems: ST elevation myocardial infarction (STEMI, 30%), non ST elevation myocardial infarction (NSTEMI, 25%), or unstable angina (38%).

Pulmonary embolism is a blockage of an artery in the lungs by a substance that has traveled from elsewhere in the body through the bloodstream (embolism).Symptoms of a PE may include shortness of breath, chest pain particularly upon breathing in, and coughing up blood. Symptoms of a blood clot in the leg may also be present such as a red, warm, swollen, and painful leg. Signs of a PE include low blood oxygen levels, rapid breathing, rapid heart rate, and sometimes a mild fever.

A **pneumothorax** is an abnormal collection of air in the pleural space between the lung and the chest wall. Symptoms typically include sudden onset of sharp, one-sided chest pain and shortness of breath. In a minority of cases the amount of air in the chest increases when a one-way valve is formed by an area of damaged tissue, leading to a tension pneumothorax. This condition can cause a steadily worsening oxygen shortage and low blood pressure. Unless reversed by effective treatment, it can result in death. Very rarely both lungs may be affected by a pneumothorax. It is often called a collapsed lung, although that term may also refer to atelectasis.

Biliary colic (**gallbladder attack)** is when pain occurs due to a gallstone temporarily blocking the bile duct. Typically, the pain is in the right upper part of the abdomen, and it can radiate to the shoulder. Pain usually lasts from one to a few hours. Often, it occurs after eating a heavy meal, or during the night. Repeated attacks are common.

Renal colic typically begins in the flank and often radiates to the hypochondrium (the part of the anterior abdominal wall below the costal margins) or the groin. It is typically colicky (comes in waves) due to ureteric peristalsis, but

may be constant. It is often described as one of the strongest pain sensations known. Although this condition can be very painful, kidney stones usually cause no permanent physical damage.

V. The content of theme

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.

In medical diagnosis, pain is regarded as a symptom of an underlying condition.

Pain motivates the individual to withdraw from damaging situations, to protect a damaged body part while it heals, and to avoid similar experiences in the future. Most pain resolves once the noxious stimulus is removed and the body has healed, but it may persist despite removal of the stimulus and apparent healing of the body. Sometimes pain arises in the absence of any detectable stimulus, damage or disease [2].

Pain is the most common reason for physician consultation in most developed countries. It is a major symptom in many medical conditions, and can interfere with a person's quality of life and general functioning. Simple pain medications are useful in 20% to 70% of cases. Psychological factors such as social support, hypnotic suggestion, excitement, or distraction can significantly affect pain's intensity or unpleasantness. In some arguments put forth in physician-assisted suicide or euthanasia debates, pain has been used as an argument to permit people who are terminally ill to end their lives.

In 1994, responding to the need for a more useful system for describing chronic pain, the International Association for the Study of Pain (IASP) classified pain according to specific characteristics:

1. region of the body involved (e.g. abdomen, lower limbs),
2. system whose dysfunction may be causing the pain (e.g., nervous, gastrointestinal),
3. duration and pattern of occurrence,
4. intensity and time since onset, andcause [8].

However, this system has been criticized by Clifford J. Woolf and others as inadequate for guiding research and treatment. Woolf suggests three classes of pain:

1. nociceptive pain,
2. inflammatory pain which is associated with tissue damage and the infiltration of immune cells, and
3. pathological pain which is a disease state caused by damage to the nervous system or by its abnormal function (e.g. fibromyalgia, peripheral neuropathy, tension type headache, etc.)

Nociceptive pain is caused by stimulation of sensory nerve fibers that respond to stimuli approaching or exceeding harmful intensity (nociceptors), and may be classified according to the mode of noxious stimulation. The most common categories are "thermal" (e.g. heat or cold), "mechanical" (e.g. crushing, tearing, shearing, etc.) and "chemical" (e.g.iodine in a cut or chemicals released during inflammation). Some nociceptors respond to more than one of these modalities and are consequently designated polymodal [8].

Nociceptive pain may also be divided into "visceral", "deep somatic" and "superficial somatic" pain. Visceral structures are highly sensitive to stretch, ischemia and inflammation, but relatively insensitive to other stimuli that normally evoke pain in other structures, such as burning and cutting. *Visceral pain*is diffuse, difficult to locate and often referred to a distant, usually superficial, structure. It may be accompanied by nausea and vomiting and may be described as sickening, deep, squeezing, and dull. *Deep somatic* pain is initiated by stimulation of nociceptors in ligaments, tendons, bones, blood vessels, fasciae and muscles, and is dull, aching, poorly-localized pain. Examples includes prains and broken bones. *Superficial* pain is initiated by activation of nociceptors in the skin or other superficial tissue, and is sharp, well-defined and clearly located. Examples of injuries that produce superficial somatic pain include minor wounds and minor (first degree)burns [8].

Neuropathic pain is caused by damage or disease affecting any part of thenervous system involved in bodily feelings (the somatosensory system).Peripheral neuropathic pain is often described as "burning", "tingling", "electrical", "stabbing", or "pins and needles". Bumping the "funny bone" elicits acute peripheral neuropathic pain.

Phantom pain is pain felt in a part of the body that has been amputated, or from which the brain no longer receives signals. It is a type of neuropathic pain.

Psychogenic pain, also called *psychalgia* or *somatoform pain*, is pain caused, increased, or prolonged by mental, emotional, or behavioral factors. Headache, back pain, and stomach pain are sometimes diagnosed as psychogenic. Sufferers are often stigmatized, because both medical professionals and the general public tend to think that pain from a psychological source is not "real". However, specialists consider that it is no less actual or hurtful than pain from any other source [2].

Breakthrough pain is transitory acute pain that comes on suddenly and is not alleviated by the patient's regular pain management. It is common in cancer patients who often have background pain that is generally well-controlled by medications, but who also sometimes experience bouts of severe pain that from time to time "breaks through" the medication. The characteristics of break through cancer pain vary from person to person and according to the cause. Management of breakthrough pain can entail intensive use of opioids, including fentanyl.

Pain is often regarded as the fifth vital sign in regard to health care because it is accepted now in healthcare that pain, like other vital signs, is an objective sensation rather than subjective [2].

Pain assessment

A person's self-report is the most reliable measure of pain. Some health care professionals may underestimate pain severity. A definition of pain widely employed in nursing, emphasizing its subjective nature and the importance of believing patient reports, was introduced by Margo McCafferyin 1968: "Pain is whatever the experiencing person says it is, existing whenever he says it does". To

assess intensity, the patient may be asked to locate their pain on a scale of 0to10, with 0 being no pain at all, and 10 the worst pain they have ever felt. Quality can be established by having the patient complete theMcGill Pain Questionnaire indicating which words best describe their pain[8].

Paincan have many causes and there are many possible treatments for it. In the nursing profession, one common definition of pain is any problem that is "whatever the experiencing person says it is, existing whenever the experiencing person says it does". Different sorts of pain management address different sorts of pain.

Pain management includes patient communication about the pain problem. To define the pain problem, a health care provider will likely ask questions such as these:

- How intense is the pain?
- How does the pain feel?
- Where is the pain?
- What, if anything, makes the pain lessen?
- When did the pain start?

After asking questions such as these, the health care provider will have a description of the pain. Pain management will then be used to address that pain.

Psychological approach: Cognitive behavioral therapy [8].

Medications

Mild pain**:** Paracetamol (acetaminophen), or a nonsteroidal anti-inflammatory drug (NSAID) such as ibuprofen.

Mild to moderate pain**:** Paracetamol, an NSAID and/or paracetamol in a combination product with a weak opioid such as tramadol, may provide greater relief than their separate use. Also a combination of opioid with acetaminophen can be frequently used.

Moderate to severe pain

When treating moderate to severe pain, the type of the pain, acute or chronic, needs to be considered. The type of pain can result in different medications being

prescribed. Certain medications may work better for acute pain, others for chronic pain, and some may work equally well on both. Acute pain medication is for rapid onset of pain such as from an inflicted trauma or to treat post-operative pain. Chronic pain medication is for alleviating long-lasting, ongoing pain [8].

Morphine is the gold standard to which all narcotics are compared. Semi-synthetic derivatives of morphine such as hydromorphone, xymorphone,nicomorphine,hydromorphinol and others vary in such ways as duration of action, side effect profile and milligramme potency. Fentanyl has the benefit of less histaminerelease and thus fewer side effects. It can also be administered via transdermal patch which is convenient for chronic pain management.

Opioids**.** From the Food and Drug Administration's website: "According to the National Institutes of Health, studies have shown that properly managed medical use of opioid analgesic compounds (taken exactly as prescribed) is safe, can manage pain effectively, and rarely causes addiction."[11].

Opioid medications can provide short, intermediate or long acting analgesia depending upon the specific properties of the medication and whether it is formulated as an extended release drug. Opioid medications may be administered orally, by injection, via nasal mucosa or oral mucosa, rectally, transdermally, intravenously, epidurally and intrathecally. In chronic pain conditions that are opioid responsive a combination of a long-acting or extended release medication is often prescribed in conjunction with a shorter-acting medication (oxycodone, morphine or hydromorphone) for breakthrough pain, or exacerbations.

Most opioid treatment used by patients outside of healthcare settings is oral (tablet,capsuleor liquid), but suppositories and skin patches can be prescribed. An opioid injection is rarely needed for patients with chronic pain [8].

Although opioids are strong analgesics, they do not provide complete analgesia regardless of whether the pain is acute or chronic in origin. Opioids are efficacious analgesics in chronic malignant pain and modestly effective in nonmalignant pain management. However, there are associated adverse effects,

especially during the commencement or change in dose. When opioids are used for prolonged periods drug tolerance, chemical dependency, diversion and addiction may occur.

Commonly-used long-acting opioids and their parent compound: oxycodone, hydromorphone, morphine, hydromorphone, oxymorphone, fentanyl, tapentadol, methadone, hydrocodone bitartrate, hydrocodone bicarbonate.

Methadone can be used for either treatment of opioid addiction/detoxification when taken once daily or as a pain medication usually administered on an every 12-hour or 8-hour dosing interval [12].

Nonsteroidal anti-inflammatory drugs

Acetaminophen/paracetamol is not always included in this class of medications. However, acetaminophen may be administered as a single medication or in combination with other analgesics (both NSAIDs and opioids). The alternatively prescribed NSAIDs such as ketoprofen and piroxicamhave limited benefit in chronic pain disorders and with long-term use are associated with significant adverse effects. The use of selective NSAIDs designated asselective COX-2 inhibitors have significant cardiovascular and cerebrovascular risks which have limited their utilization.

Antidepressants and antiepileptic drugs

Some antidepressant and antiepileptic drugs are used in chronic pain management and act primarily within the pain pathways of the central nervous system, though peripheral mechanisms have been attributed as well. These mechanisms vary and in general are more effective in neuropathic pain disorders as well as complex regional pain syndrome. Drugs such as gabapentin have been widely prescribed for the off-label use of pain control. The list of side effects for these classes of drugs are typically much longer than opiate or NSAID treatments for chronic pain, and many anti epileptics cannot be suddenly stopped without the risk of seizure [8].

Other drugs are often used to help analgesics combat various types of pain, and parts of the overall pain experience, and are hence called analgesic adjuvant

medications. Gabapentin - an anti-epileptic - not only exerts effects alone on neuropathic pain, but can potentiate opiates. While perhaps not prescribed as such, other drugs such as Tagamet (cimetidine) and even simple grapefruit juice may also potentiate opiates, by inhibiting CYP450 enzymes in the liver, thereby slowing metabolism of the drug. In addition, orphenadrine, cyclobenzaprine, trazodone and other drugs with anticholinergic properties are useful in conjunction with opioids for neuropathic pain. Orphenadrine and cyclobenzaprine are also muscle relaxants, and therefore particularly useful in painful musculoskeletal conditions. Clonidine has found use as an analgesic for this same purpose, and all of the mentioned drugs potentiate the effects of opioids overall [23].

Migraine

Preventive migraine medications are considered effective if they reduce the frequency or severity of the migraine attacks by at least 50%.Guidelines are fairly consistent in rating topiramate, divalproex/sodium valproate, propranolol, and metoprolol as having the highest level of evidence for first-line use.Recommendations regarding effectiveness varied however forgabapentin and pregabalin.Timolol is also effective for migraine prevention and in reducing migraine attack frequency and severity, while frovatriptan is effective for prevention of menstrual migraine.Tentative evidence also supports the use of magnesium supplementation. Increasing dietary intake may be better.

Amitriptyline and venlafaxine are probably also effective.Angiotensin inhibition by either an angiotensin-converting enzyme inhibitor or angiotensin II receptor antagonist may reduce attacks.Botulinum toxin (has been found to be useful in those with chronic migraines but not those with episodic ones [2].

Trigeminal neuralgia

As with many conditions without clear physical or laboratory diagnosis, TN is sometimes misdiagnosed. A TN sufferer will sometimes seek the help of numerous clinicians before a firm diagnosis is made.

There is evidence that points towards the need to quickly treat and diagnose TN. It is thought that the longer a patient suffers from TN, the harder it may be to reverse the neural pathways associated with the pain [8].

The differential diagnosis includes temporomandibular disorder.Since triggering may be caused by movements of the tongue or facial muscles, TN must be differentiated from masticatory pain that has the clinical characteristics of deep somatic rather than neuropathic pain. Masticatory pain will not be arrested by a conventional mandibular local anesthetic block. One quick test a dentist might perform is a conventional inferior dental local anesthetic block, if the pain is in this branch, as it will not arrest masticatory pain but will TN.

- The anticonvulsant carbamazepine is the first line treatment; second line medications include baclofen, lamotrigine, oxcarbazepine, phenytoin, gabapentin and pregabalin. Uncontrolled trials have suggested that clonazepam and lidocaine may be effective.
- Antidepressant medications, such as amitriptyline have shown good efficacy in treating trigeminal neuralgia, especially if combined with an anti-convulsant drug such as pregabalin [8].
- There is some evidence that duloxetine can also be used in some cases of neuropathic pain, especially in patients with major depressive disorder as it is an antidepressant. However, it should, by no means, be considered a first line therapy and should only be tried by specialist advice.
- There is controversy around opiate use such as morphine and oxycodone for treatment of TN, with varying evidence on its effectiveness for neuropathic pain. Generally, opioids are considered ineffective against TN and thus should not be prescribed [20].

Angina pectoris

The most specific medicine to treat angina is nitroglycerin. It is a potent vasodilator that decreases myocardial oxygen demand by decreasing the heart's workload. Beta blockers and calcium channel blockers act to decrease the heart's workload, and thus its requirement for oxygen. Nitroglycerin should not be given if

certain inhibitors such as sildenafil,tadalafil, or vardenafil have been taken within the previous 12 hours as the combination of the two could cause a serious drop in blood pressure. Treatments for angina are balloon angioplasty, in which the balloon is inserted at the end of a catheter and inflated to widen the arterial lumen.Stents to maintain the arterial widening are often used at the same time. Coronary bypass surgery involves bypassing constricted arteries with venous grafts. This is much more invasive than angioplasty [8].

The main goals of treatment in angina pectoris are relief of symptoms, slowing progression of the disease, and reduction of future events, especially heart attacks and death. Beta blockers (e.g.,carvedilol,propranolol,atenolol) have a large body of evidence in morbidity and mortality benefits (fewer symptoms, less disability and longer life) and short-acting nitroglycerin medications have been used since 1879 for symptomatic relief of angina.Calcium channel blockers(such asnifedipine andamlodipine),isosorbide mononitrate and nicorandil are vasodilators commonly used in chronic stable angina. A new therapeutic class, called If inhibitor, has recently been made available:Ivabradine provides pure heart rate reduction leading to major anti-ischemic and antianginal efficacy.ACE inhibitors are also vasodilators with both symptomatic and prognostic benefit. Statins are the most frequently used lipid/cholesterol modifiers, which probably also stabilize existing atheromatous plaque.Low-dose aspirin decreases the risk of heart attack in patients with chronic stable angina, and was part of standard treatment. However, in patients without established cardiovascular disease, the increase in hemorrhagic strokeand gastrointestinal bleeding offsets any benefits and it is no longer advised unless the risk of myocardial infarction is very high [18].

Exercise is also a very good long-term treatment for the angina (but only particular regimens - gentle and sustained exercise rather than intense short bursts),probably working by complex mechanisms such as improving blood pressure and promoting coronary artery collateralization.

Myocardial infarction

The pain associated with myocardial infarction may be treated with nitroglycerin or morphine. Nitroglycerin (given under the tongue or intravenously) may improve the blood supply to the heart, and decrease the work the heart must do. It is an important part of therapy for its pain relief, despite there being no benefit to overall mortality. Morphine may also be used, and is effective for the pain associated with STEMI. The evidence for benefit from morphine on overall outcomes, however, is poor and there is some evidence of potential harm[2].

Pulmonary embolism

Anticoagulant therapy is the main stay of treatment. Acutely, supportive treatments, such as oxygen or analgesia, may be required. People are often admitted to hospital in the early stages of treatment, and tend to remain under inpatient care until the INR has reached therapeutic levels.

For pain reducing: baralgine 5 ml IV, fenthanil1 - 2 ml 0,005 %,droperidol1 - 2 ml 0,25 % [8].

Pleurisy

A couple of medications are used to relieve pleurisy symptoms:

- Paracetamol(acetaminophen) or anti-inflammatory agents to control pain and decrease inflammation. Only indomethacin(brand name Indocin) has been studied with respect to relief of pleurisy.
- Codeine-based cough syrups to control the cough

There may be a role for the use of corticosteroids(for tuberculous pleurisy),tacrolimus (Prograf) and methotrexate (Trexall, Rheumatrex) in the treatment of pleurisy. Further studies are needed.

A **pneumothorax:** Ketorolak30 mgIV / IM every 6 h, or tramadol 50-100 mgSC / IM3-4 times a day [2].

Low back pain

The management of low back pain often includes medications for the duration that they are beneficial. With the first episode of low back pain the hope is a complete cure; however, if the problem becomes chronic, the goals may change

to pain management and the recovery of as much function as possible. As pain medications are only somewhat effective, expectations regarding their benefit may differ from reality, and this can lead to decreased satisfaction [14].

The medication typically recommended first are NSAIDs (though not aspirin) or skeletal muscle relaxants and these are enough for most people. Benefits with NSAIDs; however, is often small. High-quality reviews have found acetaminophen (paracetamol) to be no more effective than placebo at improving pain, quality of life, or function. NSAIDs are more effective for acute episodes than acetaminophen; however, they carry a greater risk of side effects including: kidney failure, stomach ulcers and possibly heart problems. Thus, NSAIDs are a second choice to acetaminophen, recommended only when the pain is not handled by the latter. NSAIDs are available in several different classes; there is no evidence to support the use ofCOX-2 inhibitors over any other class of NSAIDs with respect to benefits. With respect to safety naproxen may be best. Muscle relaxants may be beneficial [8].

If the pain is still not managed adequately, short term use of opioids such as morphine may be useful. These medications carry a risk of addiction, may have negative interactions with other drugs, and have a greater risk of side effects, including dizziness, nausea, and constipation. The effect of long term use is unknown. Specialist groups advise against general long-term use of opioids for chronic low back pain.

For older people with chronic pain, opioids may be used in those for whom NSAIDs present too great a risk, including those with diabetes, stomach or heart problems. They may also be useful for a select group of people with neuropathic pain [13].

Abdominal Pain. Facts and Definition of Abdominal Pain in Adults

- Abdominal pain is the feeling of pain in a person's stomach, upper or lower abdomen, and can range in intensity from a mild stomach ache to severe acute pain.

- Causes of symptoms of abdominal pain vary and may include gallbladder disease, ulcers of the stomach, food poisoning, diverticulitis, appendicitis, cancers, gynecologic (for example, fibroids, cysts, sexually transmitted diseases-STDs, and vascular problems.
- Some women experience abdominal pain during pregnancy.
- Abdominal pain can be acute or chronic and include sharp pain as well as dull pain.
- The location of the abdominal pain may be in the upper right or left side (quadrant), lower right or left side, and upper, middle, and lower.
- The cause of abdominal pain is diagnosed by a combination of history (questions the doctor asks you about your problem), physical examination (examination by a doctor), and testing (for example, X-rays and blood tests) [8].
- Treatment for abdominal pain depends upon the cause and may include anything from observation, medications and procedures that include endoscopy, and surgery.
- The prognosis for abdominal pain depends on the cause and the promptness of medical care and diagnosis.
- Type and Location of the Abdominal Pain. The type and location of pain may help the doctor find the cause. The intensity and duration of pain must also be considered when making a diagnosis. A few general characteristics of abdominal pain are:
- What the pain feels like: Abdominal pain can be sharp, dull, stabbing, cramp-like, knifelike, twisting, or piercing. Many other types of pain are also possible.
- How long the pain lasts: Abdominal pain can be brief, lasting for a few minutes, or it may persist for several hours and longer. Sometimes abdominal pain comes on strongly for a while and then lessens in intensity for a while. Is the pain continuous or does it come and go?

- Events that trigger pain: The pain may be worsened or relieved by certain events, such as worse after meals, better with a bowel movement, better after vomiting, or worse when lying down. Do certain foods trigger the pain?
- Location of the pain - The location often will help your doctor diagnose the cause of the pain [8].
- Upper left abdominal pain: Enlarged spleen
- Upper right abdominal pain: Gallbladder disease, hepatitis
- Lower left abdominal pain: Diverticulitis, ovarian cysts, ovarian torsion
- Lower right abdominal pain: Appendicitis, right ovary problems
- Upper abdominal pain: Stomach ulcers, gastritis, pancreatitis
- Lower abdominal pain: Urinary tract infections, gynecologic problems like uterine fibroids and cancer

Abdominal pain without fever, vomiting, vaginal bleeding, passing out, chest pain, or other serious symptoms often get better without special treatment [11].

- If the pain persists or if a person believes the pain may represent a serious problem, they should see a doctor.
- A heating pad or soaking in a tub of warm water may ease pain.
- Over-the-counter (OTC) antacids, such asTums, Maalox, orPepto-Bismol, also can reduce some types of abdominal pain.Activated charcoal capsules also may help.
- Acetaminophen may help. This product should be avoided if liver disease is suspected. Patients should try to avoid aspirin or ibuprofen stomach or intestinal ulcer disease is suspected; these drugs can make the pain worse [2].

Biliary colic

Initial management includes the relief of symptoms and correcting electrolyte and fluid imbalance that may occur with vomiting. Antiemetics, such as dimenhydrinate, are used to treat the nausea. Pain may be treated with anti-inflammatories,NSAIDs such as ketorolac or diclofenac. Opioids, such as

morphine, less commonly may be used. NSAIDs are more or less equivalent to opioids. Hyoscine butylbromide, an antispasmodic, is also indicated in biliary colic.

In biliary colic, the risk of infection is minimal and therefore antibiotics are not required. Presence of infection indicates cholecystitis [8].

Renal colic

Most small stones are passed spontaneously and only pain management is required. Above 5 mm the rate of spontaneous stone passage decreases. NSAIDs, such as diclofenac or ibuprofen, and antispasmodics like butyl scopolamine are used. Although morphine may be administered to assist with emergency pain management, it is often not recommended as morphine is very addictive and raises ureteral pressure, worsening the condition. Oral narcotic medications are also often used. There is typically no antalgic position for the patient (lying down on the non-aching side and applying a hot bottle or towel to the area affected may help). Larger stones may require surgical intervention for their removal, such as shockwave lithotripsy, ureteroscopy or percutaneous nephrolithotomy. Patients can also be treated with alpha blockers in cases where the stone is located in the ureter.

Deep vein thrombosis

Anticoagulation, which prevents further coagulation, but does not act directly on existing clots, is the standard treatment for DVT.Balancing risk vs. benefit is important in determining the duration of anticoagulation, and three months is generally the standard length of treatment.

The ACCP recommended initial home treatment instead of hospital treatment for those with acute leg DVT. This applies as long as individuals feel ready for it, and those with severe leg symptoms or comorbidities would not qualify. An appropriate home environment is expected: one that can provide a quick return to the hospital if necessary, support from family or friends, and phone access[8].

Drotaverine 2 mlIV / IM.

Pain in cancer

Cancer pain treatment aims to relieve pain with minimal adverse treatment effects, allowing the person a good quality of life and level of function and a relatively painless death. Though 80–90% of cancer pain can be eliminated or well controlled, nearly half of all people with cancer pain in the developed world and more than 80% of people with cancer worldwide receive less than optimal care.

Cancer changes over time, and pain management needs to reflect this. Several different types of treatment may be required as the disease progresses. Pain managers should clearly explain to the patient the cause of the pain and the various treatment possibilities, and should consider, as well as drug therapy, directly modifying the underlying disease, raising the pain threshold, interrupting, destroying or stimulating pain pathways, and suggesting lifestyle modification. The relief of psychological, social and spiritual distress is a key element in effective pain management [8].

A person whose pain cannot be well controlled should be referred to a palliative care or pain management specialist or clinic.

TESTS FOR SELF-CONTROL

1. The patient of 72 years old had pain in right leg, he cannot walk because of pain. He was ill during 2 days. Physical exam: cold right leg, with pale skin, all types of sensitivities are decreased; no peripheral pulsation on the right leg, decreased – on the left leg. He had 15 years history of peripheral vascular disease. What is preliminary diagnosis?

A. Acute ileofemoral thrombosis
B. Right Lerish syndrome
C. Acute arterial ileofemoral thrombosis
D. Laying of the abdominal aorta aneurysm

2. The patient of 63 years old had the left chest pain during 1 week. The pain irradiated to the scapula, didn’t alleviate by nitroglycerine, precipitated in the night

time. The palpation in Th3-Th5 level was painful. ECG: sinus rhythm, extrasystoles, HR 85 per min, LVH, disorder of depolarization. Normal laboratory tests. What is preliminary diagnosis?

A. Osteochondrosis
B. Angina pectoris
C. Metabolic cardiomyopathy
D. Layer aortic aneurysm
E. Myocardial infarction

3. The patient of 66years old had the left chest pain during 2 days, which was precipitated in the breathing. Medical history: 2 months ago he was operated because of prostate adenoma. Physical exam: severe cyanosis, breathlessness, breathing rate 28 per min,HR98per min, BP 125/80 mmHg (usually 140/90 mmHg). Auscultation: decreased breathing under low left lung. The neck veins were swelled. ECG: deep S - in I lead, Q in II lead, negative T wave in III, aVF, V1-V4 leads, P-pulmonalein II and III leads. What is preliminary diagnosis?

A. Lung edema
F. Transmural Myocardial infarction
B. Left-side pneumonia
C. Pulmonary embolism
D. Left-side dry pleurisies

4.The patient of 32years old had epigastric pain in the morning and in the night, 2 hours after meal, "coffee grounds" vomiting, burning, lightheadedness, weakness. Physical exam: gastroduodenal pain, positive Mendel sign, GBC: Нв 90 g/l; Leu 8,0x109/l; SR 20 mm/h. What is preliminary diagnosis?

A. perforation
B. penetration
C. gastric bleeding
D. stenosis

E. malignancy

5. The patient of 50years old was admitted to the hospital with heart pain, breathlessness after physical exertion. ECG: elevation of ST segment in II, III, aVFleads. Elevated CK-M. What is preliminary diagnosis?

A. Pulmonary embolism
B. Posterior myocardial infarction
C. Angina pectoris
D. Acute pericarditis
E. Layer aortic aneurysm

6. After physical exertion the patient of 38 years old had low back pain, which was irradiated to the left leg. The pain was precipitated in the standing position. Physical exam: positive Lasseg sign. What is preliminary diagnosis?

A. Disk hernia
B. Spinal tumor
C. Myeloma disease
D. Polyneuritis
E. Ankylosing spondylitis

7. The patient of 44 years old had severe lancet upper abdominal pain, nausea, vomiting. He became ill after fatty meal and alcohol. Physical exam: HR 106 per min, BP 100/60 mmHg; blowing and painful left upper abdomen, uncertain Blumberg's sign. What is preliminary diagnosis?

A. Acute peritonitis
B. Acute cholecystitis
C. Acute intestinal obstruction
D. Mesenteries thrombosis
E. Acute pancreatitis

8. The woman of 25 years old was admitted to the surgical hospital with low abdomen pain, which was irradiated to the right leg and anus. Medical history: abdominal trauma 2 days ago, she didn’t appeal to the doctor. Physical exam: decreased conscious, pale skin, superficial breathing, BR 30 per min, HR 120 per min, muffled heart tones, BP 90/60 mmHg, body temperature $36,1^0$C,duringpalpation of right low abdomen –positive symptoms of irritation. Gynecological exam: painful right ovarian. What is preliminary diagnosis?

A. Right ovarian apoplexy
B. Appendicitis
C. Ectopic pregnancy
D. Uterus cancer
E. Salpingoophoritis

9. The patient of 52 years old was admitted to the hospital with complaints for severe right chest pain. The pain started after ascending to the 3rd floor. He had cough, breathlessness, severe cyanosis. He had a history of disseminated tuberculosis.What is preliminary diagnosis?

A. Respiratory failure
B. Spontaneous pneumothorax
C. Pleurisies
D. Myocardial infarction
E. Heart failure

10. The patient of 42 years old had acute severe pain in the right inguinal area and leg, frequent urination, chills, nausea, vomiting. Physical exam: positive Pasternacki's sign. Urinalysis: erythrocytes, leukocytes hole area, protein. What is preliminary diagnosis?

A. Kidney infarction
B. intestinal obstruction
C. renal colic

D. radiculopathy

E. biliary cilic

11. Medical help in case of an angina attack in the polyclinic conditions includes:

A. Nitroglycerin sublingually

B. Nitrates intravenously

C. Antispasmodics

D. Narcotic analgesics.

12. Tactics of the family doctor with the first arising angina attack:

A. ECG, pain relief and outpatient treatment

B. ECG, relief of pain syndrome, aspirin 0.325 mg and hospitalization

C. Panned hospitalization

D. Outpatient examination.

13. The patient, 45 years old, suffering from constant aching pain after any food intake, weight in the epigastrium, weight loss by 5 kg per month, because she was afraid to eat because of the pain. With fibrogastroscory, there was no ulcerative defect. Primary diagnosis:

A. Chronic gastritis

B. Ulcer disease, perforation of the ulcer

C. Biliary dyskinesia

D. Rupture of abdominal aorta aneurysm.

14. Antianginal drugs used at an early stage of acute coronary syndrome, which have pain relief effect and improves patient survival:

A. Controlled (BP, HR) infusion of nitroglycerin or nitrosorbide

B. Intravenous injection of verapamil with subsequent transition to oral administration in a patient with heart failure

C. Intravenous administration of metoprolol followed by oral administration in a daily dose of 100-200 mg

D. Monotherapy with calcium antagonists.

15. Pathognomonic for angina is:

A.Retrosternal pain without connection with physical activity

B.Ventricular extrasystole after exercise

C.Chest pain and depression on ST-segment ECG 1 mm higher

D. ST segment elevation less than 1 mm.

16. The 57-year-old patient complains of chest pains 1-2 times per month in the morning during the year, erradiating under the left scapula, which pass within half an hour after taking nitroglycerin. In holter monitoring at the time of an attack, there is STsegmentelevation in the leads v2-v6 about 3 mm. The next day ST on the isline. The most probable diagnosis:

A.Stable angina pectoris

B.Myocardial infarction

C.Vasospastic (variant) angina

D.Progressive angina.

17. What is visceralgia?

A.Pain associated with the pathology of internal organs, innervation which is provided by the sympathetic nervous system

B.Pain associated with the pathology of the central nervous system

C. Pain in the spine

D. Pain associated with pathology of internal organs, innervation which is provided by the autonomic nervous system.

18. The cause of pain in the case of osteochondrosis:

A. Vertebrogenic

B.Unverebrogenic

C.Somatogenic

D. Vascular.

19. Causes of pain syndrome in the case of renal colic:

A.Ureterolithiasis and ureteral colic

B.Stricture, kink and torsion of ureter

C. Obstruction of ureteral lumen with blood clots, mucus or pus with caseous masses

D.The development of cup-and-tubal hypertension, reflex spasm of arterial kidney vessels, venous stasis and edema of the parenchyma, its hypoxia and overgrowth of the fibrous capsule.

20. Lumbago is:

A.Acute pain in the interblade area

B. Acute pain in the lower back

C.Acute headache

D. Acute pain in lower limbs.

1	2	3	4	5	6	7	8	9	10
C	**A**	**C**	**C**	**B**	**A**	**E**	**A**	**B**	**C**
11	12	13	14	15	16	17	18	19	20
A	**B**	**A**	**C**	**C**	**C**	**D**	**A**	**D**	**B**

EMERGENCY IN THE CASE OF STINGS AND BITES IN THE PRACTICE OF FAMILY DOCTOR

I. Theme actuality. The need of emergency most often occurs in case of wasps, bees, and hornet's bites. This is due to effect of venom in body of victim. In these cases may develop local allergic reaction, Quincke's edema, acute broncho-obstructive syndrome, anaphylactic shock, which require emergency. Timely emergency care saves the lives of many victims. The family doctor has to know the clinical presentation of wasps, bees, and hornet's bites and its complications.

In the rural area it is important to know the effect of venom in body of victim and to provide emergency in such cases [2].

II. Study purposes: to perform clinical examination of patient and emergency in the case of bites and stings in the practice of family doctor. To know the algorithm of primary health care in the case of bites and stings.

III. The practical skills: the algorithm of emergency in the case of wasp stings, emergency in the case of systemic allergic reactions, anaphylaxis. Clinical presentation of animal's bites, emergency on the pre-admission stage.

IV. The basic terms and notions, which have to be known by students:

Allergies are a number of conditions caused by hypersensitivity of the immune system to something in the environment that usually causes little or no problem in most people. These diseases include hay fever, food allergies, atopic dermatitis, allergic asthma, and anaphylaxis. Symptoms may include red eyes, an itchy rash, sneezing, a runny nose, shortness of breath, or swelling. Food intolerances and food poisoning are separate conditions

Anaphylaxis is a serious allergic reaction that is rapid in onset and may cause death.It typically causes more than one of the following: an itchy rash, throat or tongue swelling, shortness of breath, vomiting, lightheadedness, and low blood pressure. These symptoms typically come on over minutes to hours.

Angioedema is an area of swelling of the lower layer of skin and tissue just under the skin or mucous membranes.The swelling may occur in the face, tongue, larynx, abdomen, or arms and legs.Often it is associated with hives, which are swelling within the upper skin. Onset is typically over minutes to hours.The underlying mechanism typically involves histamine or bradykinin.

An **antitoxin** is an antibody with the ability to neutralize a specific toxin. Antitoxins are produced by certain animals, plants, and bacteria. Although they are most effective in neutralizing toxins, they can kill bacteria and other microorganisms. Antitoxins are made within organisms, but can be injected into other organisms, including humans. This procedure involves injecting an animal with a safe amount of a particular toxin. Then, the animal's body makes the antitoxin needed to neutralize the toxin. Later, the blood is withdrawn from the animal. When the antitoxin is obtained from the blood, it is purified and injected into a human or other animal, inducing passive immunity. To prevent serum sickness, it is often best to use antitoxin generated from the same species (e.g. use human antitoxin to treat humans).

V. The content of theme

Clinical presentation and emergency in the case of bees and wasp stings

- Bees and wasp stings may produce local reactions or systemic (body-wide) allergi reactions.
- Localized pain, redness, and swelling are the most common reaction to a sting.
- Severe allergic reactions to stings are known as anaphylactic reactions and may be life-threatening.

Treating bee and wasp stings depends on their severity. The majority of problems that require medical attention come from anallergic reaction to the sting. In most cases, complications from that reaction respond well to medications- when given in time [18].

Home Treatment for Bee and Wasp Stings

Most insect stings for someone who is not allergic need no more than first aid given at home. Then you can avoid further stings by wearing protective clothing, using insect repellent and staying out of infested areas.

Here are the steps you need to take after someone who is allergic has been stung:

- Remove any stingers immediately. Some experts recommend scraping out the stinger with a credit card.
- Applying ice to the site may provide some mild relief. Apply ice for 20 minutes once every hour as needed. Wrap the ice in a towel or keep a cloth between the ice and skin to keep from freezing the skin.
- Taking anantihistamine such as diphenhydramine (Benadryl) or a nonsedating one such asloratadine(Claritin) will help with it chingand swelling.
- Take a cetaminophen(Tylenol) oribuprofen (Motrin)for pain relief as needed.
- Wash the sting site with soap and water. Placing hydrocortisone cream on the sting can help relieve redness, itching, and swelling.
- If it's been more than 10 years since your last tetanus booster, get a booster within the next few days.
- Most insect stings require no additional medical care [2].

If you know you may be allergic, especially if you've had a severe reaction in the past when stung by a bee or wasp, seek immediate medical help. Take anantihistamine such as diphenhydramine (Benadryl) or a nonsedating one such as loratadine (Claritin) as soon as possible. If you have been prescribe depinephrine (Adrenaclic,Auvi-Q,EpiPen, Symjepi) for anallergic reaction, always carry two with you and use it as directed [11].

Medical Treatment for Bee and Wasp Stings

If you have a single sting with no allergic symptoms, you may require only local wound care such as cleaning and applying antibiotic ointment. Any stingers that remain will be removed. And you may be given an oral antihistamine to treat itching. The doctor may also tell you to use ibuprofen (Motrin) or acetaminophen (Tylenol) for pain. If your tetanus immunization is not current, you'll receive a booster shot.

With mild allergic symptoms such as a rash and itching over your body but no problems with breathing or other vital signs, you may be treated with an antihistamine. You may also be given steroids. In some cases, the doctor will give you an epinephrine (adrenaline) injection. Treatment may be started at the scene or in the ambulance by the emergency medics. If you are doing well, you may be sent home after observation in the emergency department.

If you have a more moderate allergic reaction such as a rash all over the body and some mild problems breathing, you will likely receive injections of antihistamines, steroids, and epinephrine. Some of these treatments may be started at the scene or in the ambulance by emergency medics. You will likely need to be observed for a prolonged period of time in the emergency department or in some cases be admitted to the hospital [2].

If you have a severe allergic reaction such as low blood pressure, swelling blocking air getting into the lungs, or other serious problems breathing, you have a true life-threatening emergency. Treatment may include placing a breathing tube into your trachea. You will likely be given injections of antihistamines, steroids, and epinephrine. Intravenous fluids may also be given. Some of these treatments may start at the scene or in the ambulance. You will be closely monitored in the emergency department and likely be admitted to the hospital - perhaps the intensive care unit.

With multiple stings - more than 10-20 - but no evidence of an allergic reaction, you may still need prolonged observation in the emergency department or admission to the hospital. At that point, the doctor may order multiple blood tests.

If you are stung inside the mouth or throat, you may need to remain in the emergency department for observation, or you may need more intensive management if complications develop [13].

An anaphylactic reaction should be treated immediately with an injection of epinephrine(adrenaline). Doses, available by prescription, come in an auto-injector that should be kept with you at all times. Two injections may be necessary to control symptoms. Here are some tips for reducing the risk of anaphylaxis:

- Know your trigger. If you've had anaphylaxis, it's very important to know what triggered the reaction. An allergist can review your medical history and, if necessary, conduct diagnostic tests. The most common triggers are:
    - Food: including peanuts, tree nuts such as walnuts and pecans, fish, shellfish, cow's milk and eggs.
    - Latex: found in disposable gloves, intravenous tubes, syringes, adhesive tapes and catheters. Health care workers, children with spina bifida and genitourinary abnormalities and people who work with natural latex are at higher-risk for latex-induced anaphylaxis.
    - Medication: including penicillin, aspirin and non-steroidal anti-inflammatory drugs such as ibuprofen, and anesthesia.
    - Insect sting: with bees, wasps, hornets, yellow jackets and fire ants being the most likely to trigger anaphylaxis [2].
- Avoid your trigger. Avoidance is the most effective way to prevent anaphylaxis. An allergist can work with you to develop specific avoidance measures tailored specifically for your age, activities, occupation, hobbies, home environment and access to medical care. Here are some general avoidance techniques for common triggers:
    - Food allergies. Be a label detective and make sure you review all food ingredient labels carefully to uncover potential allergens. When eating out, ask the restaurant how food is prepared and what ingredients are used. If you have a child with a history of anaphylaxis, it's imperative to make sure that school personnel are informed of the child's condition and a treatment plan is provided, including the administration of epinephrine.
    - Medications. Make sure all of your doctors are aware of any reactions you've had to medications so that they can prescribe safe alternatives and alert you to other medications you may need to avoid. If there are no alternative medications, you may be a candidate for desensitization, a treatment that introduces a small dose of the

medication you are allergic to. As your body becomes more tolerant to the medication, the dosage can be increased over time. While the treatment is effective, it's only temporary and must be repeated if the medication is needed again in the future [16].

- Insect stings. To help prevent stinging insects, avoid walking barefoot in grass, drinking from open soft drink cans, wearing bright colored clothing with flowery patterns, sweet smelling perfumes, hairsprays and lotion during active insect season in late summer and early fall. An allergist can also provide a preventative treatment called venomimmuno therapy (or venom allergy shots) for insect sting allergy. The treatment works by introducing gradually increasing doses of purified insect venom, and has been shown to be 90 to 98 % effective in preventing future allergic reactions to insect stings [2].

- Be prepared. Prompt recognition of the signs and symptoms of anaphylaxis is critical. If you unexpectedly come into contact with your trigger, you should immediately follow the emergency plan outlined by your doctor including the self-administration of epinephrine. If there is any doubt about the reaction, it is generally better to administer the epinephrine. Be sure to keep your epinephrine auto-injector up to date. If an expired auto-injector is the only one available in an emergency situation, administer it promptly anyway. Teachers and other caregivers should be informed of children who are at risk for anaphylaxis and know what to do in an allergic emergency.
- Seek treatment. If a severe reaction does occur and epinephrine is administered, you should be transported to the nearest emergency facility by ambulance for additional monitoring.
- Tell family and friends. Family and friends should be aware of your condition, your triggers and know how to recognize anaphylactic symptoms. If you carry epinephrine, alert them to where you keep it and how to use it.
- Wear identification. Wear and/or carry identification or jewelry (bracelet or necklace) noting condition and offending allergens.

- See a specialist. Allergists have the training and expertise to review your allergy history, conduct diagnostic tests, review treatment options and teach avoidance steps [11].
- Seek additional resources. Additional information on allergies and anaphylaxis is available on the ACAAI Web site or the Food Allergy Research & Education (FARE) atwww.foodallergy.org.
- In addition, helpful information can be found on the Food Allergy & Anaphylaxis Connection Team (FAACT) websitewww.FoodAllergyAwareness.org.

Be S.A.F.E. Action Guide.

Allergists and emergency physicians have teamed up to create the Be S.A.F.E. action guide to help you remember steps to take during and after an allergic emergency [2].

- **Seek immediate medical help.** Call 911 and get to the nearest emergency facility at the first sign of anaphylaxis, even if you have already administered epinephrine, the drug used to treat severe allergic reactions. If you have had an anaphylactic reaction in the past, you are at risk of future reactions.
- **Identify the Allergen.** Think about what you might have eaten or come in contact with – food, insect sting, medication, latex – to trigger an allergic reaction. It is particularly important to identify the cause because the best way to prevent anaphylaxis is to avoid its trigger.
- **Follow up with a specialist.** Ask your doctor for a referral to an allergist/immunologist, a physician who specializes in treating asthma and allergies. It is important that you consult an allergist for testing, diagnosis and ongoing management of your allergic disease.
- **Carry Epinephrine for emergencies.** Kits containing fast-acting, self-administered epinephrine are commonly prescribed for people who are at risk of anaphylaxis. Make sure that you carry an epinephrine kit with you at all times, and that family and friends know of your condition, your triggers and how to use epinephrine. Consider wearing an emergency medical bracelet or

necklace identifying yourself as a person at risk of anaphylaxis. Teachers and other caregivers should be informed of children who are at risk for anaphylaxis and know what to do in an allergic emergency [2].

VENOMOUS SNAKEBITE

Epidemiology: The venomous snakes of the world are classified in Table 1. A number of snakes in the family Colubridae can be dangerous to humans because of toxic salivary secretions. The incidence of venomous snakebites is low in most developed countries, but in regions of the world where people are engaged in manual agriculture, often with exposed lower extremities, attack rates are higher. About 30000 to 40000 persons die each year from venomous snakebite; incomplete reporting in disadvantaged regions probably makes this range an underestimate [2].

Table 1

Venomous Snakes of the World

Family	**Subfamily**	**Representative Species**	**Remarks**
Viperidae	Crotalinae	Rattlesnakes ***(Crotalus*** and ***Sistrurus*** species), water moccasins and copperheads ***(Agkistrodon*** species), lancehead vipers ***(Bothrops*** species)	New World and Asian pit vipers
	Viperinae	***Russell's viper*** (*Vipera russelli*), ***saw-scaled viper*** (*Echis carinatus*)***, puff adder*** (*Bitis arietans*)	European, Asian, African vipers
Elapidae		Cobras (***Naja*** species), mambas ***(Dendroaspis*** species), taipan (***Ox- yuranus scutellatus)***	Temperate and tropical New and Old World; all venomous terrestrial snakes of Australia
Hydrophiidae		**Pelagic sea snake** (*Pelamis platurus)*	Pacific and Indian oceans
Atractaspididae		Burrowing asps ***(Atractaspis*** species)	Africa, Middle East
Colubridae		**Boomslang** ***(****Dispholidus*	Rear-fanged

		*typus),***twig snake (***Thelotornis kirtlandii*)	snakes with toxic salivary secretions

Anatomy. The typical snake-venom apparatus consists of paired venom glands - one on each side of the head, below and behind the eye - connected by ducts to hollow, anterior maxillary teeth. In viperids, these teeth are large, mobile fangs that retract against the roof of the mouth when the animal is at rest. In elapids and sea snakes, the fangs are only slightly enlarged and are fixed in an erect position. For reasons that are unclear but may be related to the venom apparatus itself, venomous snakes can bite without injecting any venom. Approximately 20% of pit viper bites and an even higher percentage of bites inflicted by some other snake families (up to 75% for sea snakes) are "dry"[14].

Differentiation of venomous from nonvenomous snake species can be difficult unless one is familiar with local fauna. Viperids are characterized by somewhat triangular heads (a feature shared with many harmless snakes); elliptical pupils (also seen in the nonvenomous boas and pythons as well as some colubrids); enlarged maxillary fangs; subcaudal scalation that involves a single scale running the full width of the ventral surface of the tail for several rows just distal to the anal plate (as opposed to the two scales in each subcaudal row in most nonvenomous snakes); and, in the case of the pit vipers, the heat-sensing pits (foveal organs) for which they are named, located slightly inferior and anterior to the eyes on each side. Color pattern is notoriously unhelpful in identifying most venomous snakes except for the coral snakes, whose other body characteristics are similar to those of harmless colubrids. The American coral snakes can be identified by red, yellow (or white), and black bands completely encircling the body; a few species have red and black bands only. North of Mexico City, the immediate contiguity of red and yellow bands is fairly reliable for distinguishing a coral snake front) one of its harmless colubrid mimics. Further south, differentiation by color pattern is less reliable [22].

Immunodiagnostic techniques have been developed for species identification of the snakes involved in bites. An enzyme-linked immunoassay (ELISA) can be used to identify a specific type of snake venom in a victim's blood, wound aspirate, or urine, and this method is finding clinical application around the world. However, no commercial ELISA kit is currently available in the U.S.

Venoms and clinical manifestations. Snake venoms are complex mixtures of enzymes, low-molecular-weight polypeptides, glycoproteins, and metal ions. The enzymes and polypeptides affect the human body in a multisystem fashion. Among the deleterious components are hemorrhagins that render the vasculature leaky and thus cause both local and systemic bleeding; various proteolytic enzymes that cause local tissue necrosis, affect the coagulation pathway at various steps, or impair organ function; myocardial depressant factors that reduce cardiac output; and neurotoxins that act either pre- or postsynaptically to inhibit peripheral nerve impulses. Most snake venoms can adversely affect multiple organs [22].

Treatment

Field Management First-aid or "field" measures to be used in the management of venomous snakebite should focus on delivery of the victim to definitive medical care as quickly as possible; the victim should be as inactive as is feasible to limit systemic spread of the venom. Beyond this, any measure employed should at least do no further harm.

After viperid bites, local mechanical suction may be beneficial if applied to the puncture wounds within 3 to 5 min. A useful device is the Extractor, which delivers one atmosphere of negative pressure to the wound. Suction should be continued for at least 30 min. Mouth suction should be avoided as it inoculates the wound with oral flora and theoretically can also result in the absorption of venom by the rescuer through lesions of the upper digestive tract. A proximal lymphatic-occlusive constriction band may limit the spread of venom if applied within 30 min. To avoid compounding of tissue necrosis, however, the band should not be allowed to interrupt arterial flow. A bitten extremity should be splinted if possible

and kept at approximately heart level. Incisions into the bite site should never be made, and no form of cooling or electric shock is advantageous [20].

For elapid or sea snake bites, the Australian pressure-immobilization technique, in which the entire bitten extremity is wrapped with an elastic or crepe bandage and then splinted, is highly beneficial. The bandage is applied as tightly as it would be to treat a sprained ankle. This technique greatly restricts the absorption and circulation of venom from the bite site. However, an assessment of the potential utility of this method in viperid poisoning requires further research, as it may compound local tissue damage following these bites.

Hospital Management. The victim should be closely monitored (vital signs, cardiac rhythm, and oxygen saturation) while a history is quickly obtained and a brief but thorough physical examination is performed. The level of erythema/swelling in a bitten extremity should be marked and the circumferences measured in several locations every 15 min until swelling has stabilized [23].

Large-bore intravenous access in unaffected extremities should be obtained in the event that hypotension develops. Early hypotension is due to pooling of blood in the pulmonary and splanchnic vascular beds; hours later, hemolysis and loss of intravascular volume into soft tissues may play important roles. Fluid resuscitation with normal saline or Ringer's lactate should be initiated for clinical shock. If the blood pressure response is inadequate after the administration of 20 to 40 mL/kg body weight, then a trial of 5% albumin (10 to 20 mL/kg) is in order. If volume resuscitation fails to improve tissue perfusion, vasopressors (e.g., dopamine) should be administered. Invasive hemodynamic monitoring (central venous and/or pulmonary arterial pressures) can be helpful in such cases. Central access must be obtained with extra caution if coagulopathy is evident.

Blood should be drawn for laboratory evaluation (including determination of blood type and cross-matching) as soon as possible, before the effects of circulating venom interfere with typing. Also important are a complete blood count to evaluate the degree of hemorrhage or hemolysis, studies of renal and hepatic function, coagulation studies to identify signs of consumptive

coagulopathy, and testing of urine for blood or myoglobin. In severe cases or in the face of significant comorbidity, arterial blood gas studies, ECG, and chest radiography may be necessary [2].

Attempts to locate a source of appropriate antivenin should begin early in all cases of known venomous snake bite, regardless of symptoms. If signs or symptoms develop, they may progress rapidly, making any delay in the administration of antivenin dangerous for the victim. Antivenins rarely offer cross-protection against snake species other than those used in their production unless the species are closely related. An example of good cross-protection is in the use of Australian tiger snake (*Notechisscutatus)* antivenin for sea snake bites. The package insert accompanying a particular antivenin should be consulted for information regarding the spectrum of coverage. In the U.S., assistance in finding antivenin can be obtained 24 hours a day from the University of Arizona Poison and Drug Information Center [11].

Rapidly progressive and severe local findings (soft tissue swelling, ecchymosis, petechiae, etc.) or manifestations of systemic toxicity (signs and symptoms or laboratory abnormalities) are indications for the administration of intravenous antivenin. The package insert outlines techniques for reconstitution of antivenin (when necessary), skin-testing procedures (for potential allergy), and appropriate starting doses. Most antivenins are of equine origin and carry a risk of anaphylactic, anaphylactoid, and delayed-hypersensitivity reactions. Skin testing does not always reliably predict which patients will have an allergic reaction to equine antivenin; a skin test can be either false negative or false positive. Before antivenin infusion, the patient should receive appropriate loading doses of intravenous antihistamines (e.g., diphenhydramine, 1 mg/kg to a maximum of 100 mg; and cimetidine, 5 to 10 mg/kg to a maximum of 300 mg) in an effort to limit acute reactions. Expanding the patient's intravascular volume with crystalloids may also be beneficial in this regard (unless contraindicated by the patient's cardiac status). Epinephrine should be immediately available, and the antivenin dose to be administered should be diluted (e.g., in 1000 mL of normal saline, Ringer's lactate,

or 5% dextrose in water for adults or in 20 ml/kg for children). This volume can be decreased if necessary for the treatment of patients with compromised cardiovascular reserve. The antivenin infusion should be started slowly, with the physician at the bedside to intervene in the event of an acute reaction. The rate of infusion can be increased gradually in the absence of allergic phenomena until the total starting dose has been administered (over a period of 1 to 4 h). Further antivenin may be necessary if clinical abnormalities worsen. Laboratory values should be rechecked hourly, particularly if abnormal, until stability is ensured.

The management of a life-threatening envenomation in a victim with an apparent allergy to antivenin requires significant expertise. Consultation with a poison specialist, an intensive care specialist, or an allergist is recommended. Often, antivenin can still be administered in these situations under closely controlled conditions and with intensive premedication (e.g., with epinephrine, antihistamines, and steroids) [11].

Care of the bite wound should include application of a dry sterile dressing and splinting of the extremity with padding between the digits. Because of the risk of central spread of venom, an extremity should be elevated only when antivenin is available. Tetanus immunization should be updated as appropriate. The use of prophylactic antibiotics is controversial, as the incidence of secondary infection following venomous snakebite appears to be low. Many authorities, however, prescribe a broad-spectrum antibiotic (such as ampicillin or a cephalosporin) for the first few days [17].

If swelling in the bitten extremity raises concern that subfascial muscle edema may be impeding tissue perfusion (muscle-compartment syndrome), intracompartmental pressures should be checked by any minimally invasive technique (e.g., the wick catheter). If pressures are elevated, prompt surgical consultation for possible fasciotomy should be obtained while antivenin administration continues. Compartment syndromes are quite rare after snakebites.

Whether or not antivenin is given, any patient with signs of venom poisoning should be admitted to the hospital for observation for at least 24 h. A

patient with an apparently "dry" bite should be watched for at least 6 to 8 h before discharge. An occasional viperid "dry" bite progresses to significant toxicity after a delay of several hours, and the onset of systemic symptoms is commonly delayed for a number of hours after bites by several of the elapids (especially the coral snakes) and sea snakes. Patients bitten by these reptiles should be observed in the hospital for 24 h. [11].

Morbidity and mortality. The overall mortality rates for venomous snakebite are low in areas of the world with rapid access to medical care and appropriate antivenin. In the U.S., for example, the mortality rate is <1% for victims who receive antivenin. Eastern and western diamondback rattlesnakes (*Crotalus adamariteus* and *Crotalus atrox,* respectively) are responsible for most snakebite deaths in the U.S. Snakes responsible for large numbers of deaths in other regions of the world include the cobras *(Naja* species) of Asia and Africa, the carpet and saw-scaled vipers of the Middle East and Africa *(Echis* species), Russell's viper (*Viperarusselli)* of the Middle East and Asia, the large African vipers *(Bitis* species), and the lancehead pit vipers of Central and South America *(Bothrops* species).

The incidence of morbidity in terms of permanent functional loss in a bitten extremity is difficult to estimate but is probably substantial. Such loss may be due to muscle, nerve, or vascular injury or to scar contracture [2].

ANIMAL BITES

Domestic pets are the cause of most animal bites. Dogs are more likely to bite than cats. However, cat bites are more likely to cause infection. For these reasons, the best treatment for an animal bite is prevention.

Teach your child from earliest years to avoid strange animals. If an animal bites you or another person, report about it to the local authorities. Animals that habitually bite should be constantly restrained or destroyed. The vast majority of animal bites are inflicted by household pets, but strays and wild animals such as skunks, raccoons, bats, and others also bite thousands of people each year.

Animals living in the wild are especially dangerous because they may carry rabies, but any animal that bites a human should be impounded and checked for rabies [11].

Minor Bites. Treat a minor bite (one in which the skin is broken but not torn, and bleeding is limited) as you would any minor wound. Wash the wound thoroughly with soap and water, and apply an antibiotic cream to prevent infection

Establish whether the person who was bitten has had tetanus shot within the past 10 years; if not, seek medical care from your physician or local emergency room [2].

Serious Bites. If the bite results in a deep puncture wound, if the skin in the bitten area is badly torn, or if bleeding persists, apply pressure to stop the bleeding.

Then seek emergency medical assistance. Your physician will examine, wash, and treat the wound; he or she also may give a tetanus shot.

Tetanus, also known as **lockjaw**, is an infection characterized by muscle spasms. In the most common type, the spasms begin in the jaw and then progress to the rest of the body. These spasms usually last a few minutes each time and occur frequently for three to four weeks. Spasms may be so severe that bone fractures may occur. Other symptoms may include fever, sweating, headache, trouble swallowing, high blood pressure, and a fast heart rate. Onset of symptoms is typically three to twenty-one days following infection. It may take months to recover. About 10% of those infected die.

The incubation period of tetanus may be up to several months, but is usually about ten days. In general, the farther the injury site is from the central nervous system, the longer the incubation period. The shorter the incubation period, the more severe the symptom[2].

Tetanus is caused by the tetanus bacterium *Clostridium tetani*. Tetanus is an international health problem, as *C.tetani*s pores are ubiquitous. Spores can be introduced into the body through a puncture wound (penetrating trauma). Because *C.tetani*is an anaerobic bacterium, it and itsendospores thrive in environments that

lack oxygen.such as a puncture wound. The disease occurs almost exclusively in persons inadequately immunized.

The spores can also be found on skin surfaces and in contaminated heroin. Heroin users, particularly those that inject the drug subcutaneously, appear to be at high risk of contracting tetanus. Rarely, tetanus can be contracted through surgical procedures, intramuscular injections, compound fractures, and dental infections. The bite of a dog can transmit tetanus [11].

The tetanus toxin initially binds to peripheral nerve terminals. It is transported within the axon and across synaptic junctions until it reaches the central nervous system.

Tetanus can be prevented by vaccination with tetanus toxoid.

Treatment

Mild cases of tetanus can be treated with:

- tetanus immunoglobulin(TIG),also called *tetanus antibodies* or *tetanus antitoxin*.It can be given as intravenous therapy or by intramuscular injection.
- Metronidazole IV for 10 days
- Diazepamoral or IV

Severe cases will require admission to intensive care. In addition to the measures listed above for mild tetanus [2].

SPIDER BITES

Of the more than 30000 recognized species of spider, only about 100 defend themselves aggressively and have fangs sufficiently long to penetrate human skin. The venom that spiders use to immobilize and digest their prey can cause necrosis of skin and systemic toxicity. While the bites of most spiders are painful but not harmful, envenomations of the brown or fiddle spiders (*Loxosceles* species), widow spiders (*Latrodectus* species), and other species may be life-threatening. Identification of the offending spider should be attempted, since specific treatments exist for bites of widow and brown recluse spiders and since injuries attributed to spiders are frequently due to other causes [14].

Recluse Spider Bites and Necrotic Arachnidism Severe necrosis of skin and subcutaneous tissue follows envenomation by *loxoscelesreclusa,* the brown recluse spider, and by at least four other species *of Loxosceles* in the southern and midwestern U.S. Other spiders that produce necrotic ulceration include the hobo spider *(Tegenariaagrestis)* in the Pacific Northwest, the sac spiders (*Chiracanthium* species) throughout the U.S. and abroad, the South American brown spider *Loxosceleslaeta* in Central, and South America, and other *Loxosceles* species in Africa and the Middle East. AH these spiders measure 7 to 15 mm in body length and 2 to 4 cm in leg span. Recluse spiders are brown and have a dark violin-shaped spot on their dorsal surface; hobo spiders are brown with gray markings; and sac spiders may be pale yellow, green, or brown [14].

These spiders are not aggressive toward human beings and bite only if threatened or pressed against the skin. They hide under rocks and logs or in caves and animal burrows, and they emerge at night to hunt other spiders and insects. They invade homes, particularly in the fall, and seek dark and undisturbed hiding spots in closets, in folds of clothing, or under furniture and rubbish in storage rooms, garages, and attics. Bites often occur while the victim is dressing and are sustained primarily to the arms, neck, and lower abdomen.

The clear viscous venoms of these spiders contain an esterase, alkaline phosphatase, protease, and other enzymes that produce tissue necrosis and hemolysis. Sphingomyelinase B, the most important dermonecrotic factor, binds cell membranes and promotes chemotaxis of neutrophils, leading to vascular thrombosis and an Arthus-like reaction. Initially, the bite is painless or produces a stinging sensation. Within the next few hours, the site becomes painful and pruritic, with central induration surrounded by a pale zone of ischemia and a zone of erythema. In most cases, the lesion resolves without treatment over 2 to 3 days. In severe cases, the erythema spreads, and the center of the lesion becomes hemorrhagic and necrotic with an overlying bulla. A black eschar forms and sloughs several weeks later, leaving an ulcer that may be ≥25 cm in diameter and eventually a depressed scar. Healing usually takes place within 3 to 6 months but

may take as long as 3 years if adipose tissue is involved. Local complications include injury to nerves and secondary infection. Fever, chills, weakness, headache, nausea, vomiting, myalgia, arthralgia, maculopapular rash, and leukocytosis may develop within 72 h of the bite. In rare instances, acute complications such as hemolytic anemia, hemoglobinuria, and renal failure are fatal [14].

Initial management includes local cleansing, application of sterile dressings and cold compresses, and elevation and loose immobilization of the affected limb. Analgesics, antihistamines, antibiotics, and tetanus prophylaxis should be administered if indicated. Within the first 48 to 72 h, the administration of dapsone, a leukocyte inhibitor, may halt the progression of lesions that are becoming necrotic. Dapsone is given in oral doses of 50 to 100 mg twice daily after glucoses-phosphate dehydrogenase deficiency has been ruled out. The efficacy of locally or systemically administered glucocorticoids has not been demonstrated, and a potentially useful *Loxosceles*-specific antivenin has not been approved for use in the U.S. Debridement and later skin grafting may be necessary after signs of acute inflammation have subsided, but immediate surgical excision of the wound is detrimental. Patients should be monitored closely for signs of hemolysis, renal failure, and other systemic complications.

Widow Spider Bites. The bite of the female widow spider is notorious for the effect of its potent neurotoxin. *Latrodectusmactans,* the black widow, has been found in every state of the U.S. except Alaska and is most abundant in the southeast. It measures up to 1 cm in body length and 5 cm in leg span, is shiny black, and has a red hourglass marking on the ventral abdomen. Other dangerous North American *Latrodectus* species include *L. geometricus* (the brown widow), *L. bishopi* (the red widow), *L. variolus,* and *L. hesperus,* and there are related species in other temperate and subtropical parts of the world [2].

Widow spiders spin their webs under stones, logs, plants, or rock piles or in dark spaces in barns, garages, and outhouses. Bites are most common in the summer and early autumn and occur when the web is disturbed or when the spider

is trapped or provoked. The buttocks or genitals are sites of bites incurred by humans while sitting in an outdoor privy.

The initial bite goes unnoticed or is perceived as a sharp pinprick. Two small red marks, mild erythema, and edema develop at the fang entrance site. The oily yellow venom that is injected does not produce local necrosis, and some persons experience no other symptoms. However, alpha-latrotoxin, the most active component of the venom, binds irreversibly to nerves and causes release and eventual depletion of acetylcholine, norepinephrine, and other neurotransmitters from presynaptic terminals. Within 30 to 60 min, painful cramps spread from the bite site to large muscles of the extremities and the trunk. Extreme rigidity of the abdominal muscles and excruciating pain may suggest peritonitis, but the abdomen is not tender on palpation. Other features include salivation, diaphoresis, vomiting, hypertension, tachycardia, labored breathing, anxiety, headache, weakness, fasciculations, paresthesia, hyperreflexia, urinary retention, uterine contractions, and premature labor. Rhabdomyolysis and renal failure have been reported, and respiratory arrest, cerebral hemorrhage, or cardiac failure may end fatally, especially in very young, elderly, or debilitated persons. The pain begins to subside during the first 12 h but may recur during several days or weeks before resolving spontaneously [14].

Treatment consists of local cleansing, application of ice packs, and tetanus prophylaxis. Hypertension that does not respond to analgesics and antispasmodics, such as benzodiazepines or methocarbamol, requires specific antihypertensive medication. Intravenous administration of one or two vials of a widely available equine antivenin rapidly relieves pain and can be life-saving. Because of the risk of anaphylaxis and serum sickness, antivenin should be reserved for severe cases involving respiratory arrest, uncontrollable hypertension, seizures, or pregnancy.

Envenomations by Tarantulas and Other Spiders. Tarantulas are long-lived, hairy spiders of which 30 species are found in the U.S., primarily in the southwest. The tarantulas that have become popular household pets are usually imported species with bright colors and a leg span of up to 25 cm. Tarantulas bite only when

threatened and cause no more harm than a bee sting, but the venom occasionally provokes deep pain and swelling. Several species are covered with urticating hairs that are launched in the thousands when a threatened spider rubs its hind legs across the dorsal abdomen. These hairs penetrate human skin and produce pruritic papules that last for weeks. Treatment of bites includes local washing and elevation of the bitten area, tetanus prophylaxis, and analgesic administration. Antihistamines and topical or systemic glucocorticoids are given for exposure to urticating hairs [2].

Atraxrobustus, the Sydney funnel-web spider of Australia, and ***Phoneutria*** species, the South American banana spiders, are among the most dangerous spiders in the world because of their aggressive behavior and potent neurotoxins. Envenomation by ***A. robustus*** causes a rapidly progressive neuromotor syndrome that can be fatal within 2 h. The bite of the banana spiders causes severe local pain followed by profound systemic symptoms and respiratory paralysis that can lead to death within 2 to 6 h. Specific antivenins for envenomation by each of these spiders are available. ***Lycosa*** species (wolf spiders) are found throughout the world and may produce painful bites and transient local inflammation.

Scorpion stings.Scorpions are crablike arachnids that feed on ground-dwelling arthropods and small lizards, which they grasp with a pair of frontal pinchers and paralyze by injecting venom from a stinger on the tip of the tail. Painful but relatively harmless scorpion stings need to be distinguished from the potentially lethal envenomations that are produced by about 30 of the approximately 1000 known species and cause more than 5000 deaths worldwide each year. Scorpions feed at night and remain hidden during the day in crevices or burrows or under wood, loose bark, or rocks on the ground. They seek cool spots under buildings and often enter houses, where they get into shoes, clothing, or bedding or enter bathtubs and sinks in search of water. Scorpions sting human beings only when disturbed [18].

Scorpions of the U.S. Of the 40 or so scorpion species in the U.S., only the bark scorpion ***(Centruroides sculpturatus*** or ***Centruroides exilicauda)*** produces

venom that can be lethal. Stings of the other species, such as the common striped scorpion ***Centruroides vittatus***and the large ***Hadrurus arizonensis,*** cause immediate sharp local pain followed by edema, ecchymosis, and a burning sensation. Symptoms typically resolve within a few hours, and skin does not slough. Allergic reactions to the venom sometimes develop [11].

The deadly ***C. sculpturatus*** of the southwestern U.S. and northern Mexico measures about 7 cm in length and is yellow-brown in color. Its venom contains neurotoxins that cause sodium channels to remain open and neurons to fire repetitively. In contrast to the stings of nonlethal species, ***C. sculpturatus*** envenomations are usually associated with little swelling, but prominent pain, paresthesia, and hyperesthesia can be accentuated by tapping on the affected area (the tap test). These symptoms soon spread to other locations; dysfunction of cranial nerves and hyperexcitability of skeletal muscles develop within hours. Patients present with restlessness, blurred vision, abnormal eye movements, profuse salivation, lacrimation, rhinorrhea, slurred speech, difficulty in handling secretions, diaphoresis, nausea, and vomiting. Muscle twitching, jerking, and shaking may be mistaken for a seizure. Complications include tachycardia, arrhythmias, hypertension, hyperthermia, rhabdomyolysis, and acidosis. Symptoms progress to maximal severity in about 5 h and subside within a day or two, although pain and paresthesia can last for weeks. Fatal respiratory arrest is most common among young children and the elderly.

Other Dangerous Scorpions. Envenomations by *Leiurusquinque striatus* in the Middle East and North Africa, by *Mesobuthus famulus* in India, by *Androctonus* species along the Mediterranean littoral and in North Africa and the Middle East, and by *Tityusserrulatus* in Brazil cause massive release of endogenous catecholamine with hypertensive crises, arrhythmias, pulmonary edema, and myocardial damage. Acute pancreatitis occurs with stings of *Tityustrinitatis* in Trinidad, and central nervous toxicity complicates stings of *Parabuthus and Buthotus* scorpions of South Africa. Tissue necrosis and hemolysis may follow stings of the Iranian *Hemiscorpius lepturus*[2].

Treatment. Identification of the offending scorpion aids in planning therapy. Stings of nonlethal species require at most ice packs, analgesics or antihistamines. Because most victims of dangerous envenomation (such as those produced by *C. SCULPTURATUS*) experience only local discomfort, they can be managed at home with instructions to return to the emergency department if signs of cranial-nerve or neuromuscular dysfunction develop. Aggressive supportive care and judicious use of antivenin can reduce or eliminate mortality from more severe envenomations. Keeping the patient calm and applying pressure dressings and cold packs to the sting site decrease the absorption of venom. Although narcotics and sedatives can control restlessness and hypertension, these agents interfere with protective airway reflexes and should not be given to patients with neuromuscular symptoms unless endotracheal intubation is planned. Hypertension and pulmonary edema respond to nifedipine, nitroprusside, hydralazine, or prazosin, and bradyarrhythmias can be controlled with atropine [18].

Commercially prepared antivenins are available in several countries for some of the most dangerous species. A caprine *C.**sculpturatus***antiveninis available as an investigational drug only in Arizona. Because of the risk of anaphylaxis or serum sickness following administration of goat serum, use of the antivenin is controversial. Intravenous administration of antivenin rapidly reverses cranial-nerve dysfunction and muscular symptoms but does not affect pain and paresthesia.

Prevention. In scorpion-infested areas, shoes, clothing, bedding, and towels should be shaken and inspected before being used. Removal of wood, stones, and debris from yards and campsites eliminates hiding places for scorpions, and household spraying of insecticides can deplete their source of food [2].

TESTS FOR SELF-CONTROL

1. The patient with the viper’s bite on the right hand was admitted to the ambulatory of family doctor. The bite was 5-10 min ago. The patient complained

to the severe pain in the place of bite. Physical exam: hyperemia, 2 stab wounds. Which will be emergency in this case?

A. hand's immobilization, removal of poison, forced diuresis

B. take alcohol and drug for BP increasing

C. Applying the tourniquet on the upper limb above the bite site

D. cut the place of bite

E. inject the antibiotics around the bite

2. Forester of 45 years old was admitted to the rural ambulatory after fox's bite in the right leg. Before it were some cases of rabies among wild animals in this district. Which will be emergency in this case?

A. to wash the wound with soap, to admit the patient to nearest hospital

B. to cut the edges of the wound, to admit the patient to nearest hospital

C. to admit the patient to nearest hospital

D. to wash the wound with soap, out-patient observation

E. to cut the edges of the wound, out-patient observation

3. The woman of 22 years old was bitten by snake during walking in the forest. 8 h later she felt fainting. Clinical exam: pale cold skin, swollen and cyanotic right hand, heart rate of 122 per min, breathing rate of 22 per min. Which will be emergency in this case?

A. forced diuresis

B. hemodialysis

C. IV therapy

D. antitoxic serum

E. plasmapheresis

4. After bee's bite in the neck the woman had the sign of angioedema edema: feeling of lack of air, agitation, fainting, swelling of face, tongue and neck, acute

respiratory failure, arterial hypotension, BP 60/40 mmHg . She had the history of allergies. Which will be emergency in this case?

A. IV adrenaline and glucocorticoids

B. IV sodium bicarbonate and atropine

C. IV tavegil and cordiamine

D. IV Euphyllinum and antibiotics

E. artificial ventilation mouth-to-mouth and closed-heart

5. After bee's bite the patient of 27 years old was appealed to the doctor with the complaint for local swelling of lips, eyelids, hoarseness of the voice, cough, difficult breathing, dizziness, BP of 110/70 mHg, HR 96 per min. The anaphylaxis was diagnosed. Which will be emergency in this case?

A. Lasix

B. hemosorbtion

C. prednisolone

D. enterosorbtion

E. contrycal

6. After bee's bite on the leg the patient felt weakness pricking in the throat, red face, shortness of breath. Before he had only local swelling after bee's bite. Which will be emergency in this case?

A. aspirin

B. Put the tourniquet above the bite

C. Put the tourniquet below the bite

D. remove the sting, apply the cold, put the tourniquet above the bite, emergency call

E. emergency call

7. After snake bite the patient was admitted to the hospital. Clinical exam: pain in the place of bite, HR of 100 per min, BP of 100/60 mmHg, normal conscious. Which will be emergency in this case?

A. glucocorticoids
B. Water and salt solutions
C. cardiotonics
D. specific serum
E. narcotics drugs

8. The girl had bee's bite in the right hand. After 30 min she was admitted to the hospital with complaint to the weakness, feeling of heat throughout the body, compression in the chest, ringing in the ears.The sting was removed. The moderate anaphylaxis was diagnosed. Which will be emergency in this case?

A. Calcium Chloride
B. adrenaline
C. prednizolone
D. tavegil
E. cordiamin

9. After bee's bite the boy of 10 years old had paraorbital swelling, red face and itchy. Clinical exam: HR 94 per min, BP 100/60 mmHg. Which will be emergency in this case?

A. anaphylaxis
B. urticaria
C. Angioedema
D. Atopic dermatitis
E. Nephrotic syndrome

10. For snake bite is not typical:

A. Petechial and spotted hemorrhages

B. Pale skin, dizziness
C. womitting, nausea, tachycardia, hypotension
D. acute parenchymal bodies failure
E. hypersalivation, bronchorheia, photophobia

11. An eight-year-old child is brought to the emergency department by his parents after receiving multiple fire ant bites at his home. His lips are swollen, and he is complaining of itching. During your assessment, you note that he is wheezing. The most appropriate immediate treatment for this child is:

A. Antibiotic
B. IV antihistamine
C. IV steroid
D. IM epinephrine

12. Name the animals, which bite people more often:

A. small rodents
B. dogs
C. cats
D. spiders

13. Scorpio bite clinics include:

A. temperature increase up to 380C with chill
B. the appearance of nausea
C. vomiting
D. all of the above

14. In the sharing places of shark, the following rules are necessary:

A. to bathe in dark clothes
B. float calmly without sudden movements
C. do not panic

D. all of the above

15. Hematoxilin and protease is secreted by the following species of snakes:

A. vipers

B. pit snake

C. aspid snakes

D. sea snakes

16. To the infection risk factors relates the following:

A. deep inflamed and contaminated wounds

B. wounds requiring surgical treatment

C. crushed and punctured wounds

D. all of the above

17. Duration of vaccination against rabies:

A. on the day of infection, 3,7, 14, 28 days

B. 3,7,14, 21, 28 day

C. on the day of infection, 3, 7, 14, 21 days

D. all of the above

18. Rabies prevention with the help of vaccination begins immediately in case of:

A. all bites, scratches, smearing of the skin and the mucous membranes,caused by the animals which are obviously suffering from rabies,suspicious of rabies and unknown

B. animals (category II and III exposition)

C. injury by objects contaminated with saliva or brain rabid or suspicious on rabies animals

D. bites through clothing if it is punctured or torn, through thin or knitted clothes

E. all of the above

19. In case of eating of passive-poisoning fish, emergency help includes the following measures:

A. washing the stomach with water

B. the use of activated carbon

C. taking saline laxatives

D. all of the above

20. Emergency help in case of snake bite consists of the following activities, except:

A. put the patient in the shadow with the head down, use of anesthetics

B. flush surface lesions with large amount of water, rinse wound with soapy water, treat with alcohol or diamond greens

C. remove poison by squeezing or sucking pear

D. impose a cold

1	2	3	4	5	6	7	8	9	10
A	**A**	**C**	**A**	**C**	**D**	**D**	**B**	**C**	**E**
11	12	13	14	15	16	17	18	19	20
C	**B**	**D**	**D**	**A**	**D**	**A**	**E**	**D**	**D**

EMERGENCY IN THE CASE OF ELECTRICAL INJURY AND DROWNING IN THE PRACTICE OF FAMILY DOCTOR

I. Theme actuality. Potential threat for a person is the amperage more than 0.15 amperes, as well as the constant and alternating voltage of more than 36 volts. The consequences of electric trauma can take a variety of forms - from minor burns to stopping circulation and breathing and loss of consciousness, which, accordingly, often becomes the cause of a fatal outcome. In the vast majority of cases, the effect of the current is more normal, accompanied by damage to the skin, mucous membranes and bones in the places of entry and exit of electrical discharge. Also, the central and peripheral nervous systems are affected [2].

Drowning is the third largest cause of death from unintentional injuries in the world - it accounts for 7% of all deaths due to injuries. It is estimated that there are 372,000 deaths every year in the world from drowning. Global assessments can significantly underestimate the real public health problem associated with drowning. Children, men and people with special abilities are exposed to greatest risk of drowning.

II. Study purposes: to estimate the condition of patient and provide medical care in the case of electrical injury and drowning in the practice of family doctor. To know the algorithm of emergency; the interrelation with secondary and tertiary health care setting.

III. The practical skills: to know the classification, clinical presentation and emergency algorithm in the case of electrical injuries and drowning on the pre-admission stage.

IV. The basic terms and notions, which have to be known by students:

Electrical injury is a physiological reaction caused by electric current passing through the human body. Electric shock occurs upon contact of a body part with any source of electricity that causes a sufficient magnitude of current to pass through the victim's flesh, viscera or hair. Physical contact with energized wiring

or devices is the most common cause of an electric shock. In cases of exposure to high voltages, such as on a power transmission tower, physical contact with energized wiring or objects may not be necessary to cause electric shock, as the voltage may be sufficient to "jump" the air gap between the electrical device and the victim.

An **electrical burn** is a burn that results from electricity passing through the body causing rapid injury. The mortality rate is 3-5%.Electrical burns differ from thermal or chemical burns in that they cause much more subdermal damage. They can exclusively cause surface damage, but more often tissues deeper underneath the skin have been severely damaged. As a result, electrical burns are difficult to accurately diagnose, and many people underestimate the severity of their burn. In extreme cases, electricity can cause shock to the brain, strain to the heart, and injury to other organs

Dry drowning is a term that has never had an accepted medical definition, and that is currently medically discredited. Drowning in which no water enters the lungs. The drowning is the "process of experiencing respiratory impairment from submersion/immersion in liquid. This definition resulted in only three legitimate drowning subsets: fatal drowning, non-fatal drowning with illness/injury, and non-fatal drowning without illness/injury. The end result pathophysiology of hypoxemia, acidemia, and eventual death is the same whether water entered the lung or not. As this distinction does not change management or prognosis, but causes significant confusion due to alternate definitions and misunderstandings, it is generally established that pathophysiological discussions of "dry" versus "wet" drowning are not relevant to drowning care.

Drowning is defined as respiratory impairment from being in or under a liquid.It is further classified by outcome into: death, ongoing health problems, and no ongoing health problems. Drowning itself is quick and silent, although it may be preceded by distress which is more visible. Generally, in the early stages of drowning, very little water enters the lungs: a small amount of water entering the trachea causes a muscular spasm that seals the airway and prevents the passage of

both air and water until unconsciousness occurs. This means a person drowning is unable to shout or call for help, or seek attention, as they cannot obtain enough air. The instinctive drowning response is the final set of autonomic reactions in the 20–60 seconds before sinking underwater, and to the untrained eye can look similar to calm safe behavior.

V. The content of theme

DROWNING AND NEAR-DROWNING

It is an unexpected tragedy when a previously healthy person dies or is exposed to severe cerebral hypoxia and suffers permanent brain damage. For many years, drowning was considered a "fight for survival": Arms flailing and screaming for help, a person who could not swim struggled to remain on the surface of the water to reach safety. This situation, however, is rarely reported by persons at the scene of aquatic emergencies. Furthermore, no single set of circumstances comprises drowning or near-drowning. It may be a secondary event following such precursors as head or spinal trauma, hypoxia-induced unconsciousness, or unconsciousness due to preexisting cardiovascular disease, sudden cardiac death, or myocardial infarction. The initiating event is usually unknown, so the drowned or near-drowned victim must be treated based on probable physiologic effects of the near-drowning itself. If survival with normal brain function is to occur, a thorough understanding of the pathophysiology of drowning and an organized approach to therapy are imperative [14].

Pathophysiology of drowning. Approximately 90% of drowning victims aspirate fluid into their lungs. In those who do not aspirate fluid, hypoxemia results simply from apnea. In those who do aspirate, the volume and the composition of the fluid determine the physiologic basis of the hypoxemia. Fresh water aspiration alters the surface tension properties of pulmonary surfactant arid makes alveoli unstable, which causes a decreased ventilation/perfusion ratio. Some alveoli collapse and become atelectatic, which produces a true or absolute intrapulmonary shunt, while others are poorly ventilated and produce a relative shunt; in either case, significant pulmonary venous admixture occurs. Fresh water

in the alveoli is hypotonic and is rapidly absorbed and redistributed throughout the body. While some have proposed that water continues to enter the lungs after death, at autopsy, the lungs of victims who died in the water frequently contain little water. These findings support the premise that active respiration determines the volume of water aspirated [5].

Hypertonic seawater pulls additional fluid from the plasma into the lungs, and thus the alveoli are fluid-filled but perfused, which causes substantial pulmonary venous admixture. With both types of water, pulmonary edema may occur secondary to events such as fluid shifts, a change in capillary permeability, or cerebral hypoxia, which causes neurogenic pulmonary edema. Regardless of the cause, pulmonary edema adds to the ventilation/perfusion abnormality.

Water that is grossly contaminated with bacteria or that contains particulate matter may complicate the picture. Particulate matter can obstruct the smaller bronchi and respiratory bronchioles. Grossly contaminated water increases the risk of severe pulmonary infection. Neither problem is sufficiently common, however, to justify recommending specific therapy routinely for all victims [13].

At least 85% of near-drowned victims are thought to aspirate 22 mL/kg of water or less, which does not significantly affect blood volume or serum electrolyte concentrations. After resuscitation, by the time blood is analyzed, serum electrolyte concentrations usually are normal or close to normal. Significant changes are documented in only approximately 15% of those who cannot be resuscitated and only rarely in those who are resuscitated. These findings suggest that either a small amount of water was aspirated, fluid was rapidly redistributed, or both. T'herefore, electrolyte disturbance rarely needs treatment. When a large quantity of water is aspirated, seawater causes hypovolemia, which concentrates extracellular electrolytes, and fresh water causes acute hypervolemia. If enough water is aspirated that plasma becomes severely hypotonic and the patient is hypoxemic, red cell membranes can rapture, and plasma hemoglobin and serum potassium concentrations increase significantly. However, this development has been reported only rarely. With rapid redistribution of fluid and development of

pulmonary edema, even freshwater victims frequently demonstrate hypovolemia by the time they reach the hospital [2].

Hypercarbia, which is associated with apnea and/or hypoventilation, is less often documented by blood gas analysis than is hypoxemia. While hypoxemia due to pulmonary venous admixture persists in all near-drowned victims who aspirate water, hypercarbia is usually corrected sooner with artificial mechanical ventilation and improved minute ventilation and, thus, is reported in only a small percentage of victims evaluated at the hospital. Besides hypoxemia, metabolic acidosis also persists in most patients. Abnormal cardiovascular function, usually ascribed to hypoxemia, is brief with effective, timely therapy. Abnormality in renal function is uncommon, but when it does occur, it too is secondary to hypoxemia, altered renal perfusion, or, in extremely rare circumstances, significant hemoglobinuria.

Treatment of near-drowning

Retrieve the victim from the water, and, if necessary, performing artificial ventilation and circulation.

An abdominal thrust not be used routinely in victims of submersion (Heimlich manoeuvre - a technique in first aid to dislodge a foreign body in a person's windpipe by applying sudden upward pressure on the upper abdomen). In these patients, an abdominal thrust may lead to regurgitation of gastric contents and, thus, to aspiration of the vomitus. Further, an abdominal thrust may delay ventilatory or circulatory resuscitation. Therefore, an abdominal thrust should only be used when the airway is obstructed with a foreign body or when the victim fails to respond to mouth-to-mouth ventilation [22].

Central nervous system depression presents the major therapeutic challenge in near-drowning. Some factors that adversely influence survival are prolonged submersion, delay in initiation of effective cardiopulmonary resuscitation, severe metabolic acidosis (pH < 7,1), asystole upon arrival to a medical facility, fixed dilated pupils, and a low Glasgow coma score (<5). None of these predictors is absolute, however, and normal survivors have been reported in all of the above

categories. Absence of cortical evoked potentials does indicate irreversibility of the cerebral hypoxic lesion; this test, however, cannot be done in the field to guide rescuers.

Hypothermia appears to be protective, but only if it occurs early, at the time of the accident, in which case it increases the victim's chance of cerebral salvage after relatively long periods of acute hypoxia and cardiac arrest. While hypothermia prolongs tolerance to hypoxia, it also can precipitate fatal cardiac arrhythmia: thus, its occurrence can be helpful on the one hand and harmful on the other. The diving reflex produces bradycardia, breath-holding, and circulatory redistribution when the face is submerged in cold water. However, the effect of the diving reflex in explaining cerebral recovery after prolonged immersion has not been specifically documented [23].

Significant pulmonary venous admixture usually persists even after successful resuscitation; therefore, supplemental oxygen should be administered until arterial blood gas analysis confirms that oxygen is no longer needed. Intravenous access should be established as soon as possible. The trachea should be intubated if necessary for airway maintenance or to facilitate mechanical ventilatory support. ECG monitoring will facilitate prompt treatment of cardiac arrhythmia.

Victims should be transported to a hospital for definitive testing of the adequacy of ventilation and blood gas exchange, cardiac activity, and effective circulating blood volume. Other variables, such as serum electrolyte concentrations, renal function, and cerebral status, should be analyzed as indicated.

The single most effective treatment for hypoxemia, regardless of cause, is mechanical ventilatory support including continuous positive airway pressure (CPAP). After freshwater aspiration, improvement in ventilation/perfusion matching is more consistent when CPAP is combined with mechanical inflation of the lung than with spontaneous respiration. The question of whether CPAP should be combined with spontaneous respiration or with mechanical ventilation should be decided by whether the specific patient can perform the necessary work of

breathing, adequately eliminate carbon dioxide, and adequately match ventilation/perfusion ratios. Positive airway pressure should be withdrawn gradually as the lungs stabilize and ventilation/perfusion ratio returns toward normal [16].

The pH in near-drowned victims is commonly significantly acidotic, which, in turn, can depress cardiac function. The metabolic component of the acidosis, if it results in a pH < 7.20, should be corrected pharmacologically, although there is some disagreement on this point. With cardiovascular instability, cannulation of the pulmonary artery with a Swan-Ganz catheter or evaluation by transesophageal echocardiography is indicated. Many patients will be hypovolemic from loss of fluid into the lung as pulmonary edema or from decreased venous return secondary to increased intrathoracic pressure during mechanical ventilatory support.

Because recovery after long periods of submersion under frigid conditions has been reported, body temperature should be taken into account before a decision is made to terminate therapy. The body temperature of victims depends not only on the temperature of the water from which they are retrieved but also on how well they were insulated by clothing. The volume of water actually aspirated is also important, because a large volume, if distributed before cardiac arrest occurs, can produce rapid central cooling. Thus, cold water can be protective when it produces total-body hypothermia, which decreases metabolic oxygen requirement. On the other hand, cold water may also contribute to the accident if hypothermia occurs before total submersion, and severe, or even fatal, cardiac arrhythmia results. Several methods of rewarming hypothermic victims have been advocated, but any technique that increases oxygen utilization, such as shivering, should be avoided [2].

Regardless of the conditions surrounding a drowning or near-drowning, treatment should adhere to the following sequence of priorities:

1. Remove the victim from the water as soon as possible and stabilize the patient's head and neck if trauma is suspected.

2. Immediately follow the ABCs of cardiopulmonary resuscitation -even in the water if this does not endanger the rescuer.
3. If the patient is unconscious, protect the airway as needed with endotracheal intubation.
4. Establish venous access as soon as possible.
5. Provide supplemental oxygen and ventilatory support until each is no longer needed. This can be judged from analysis of arterial blood for oxygen tension, carbon dioxide tension, and pH.
6. Monitor cardiac rhythm with an electrocardioscope as soon as possible.
7. Monitor body temperature and restore it to normal.
8. If the patient has persistent respiratory insufficiency, provide intensive pulmonary support with CPAP and mechanical ventilation therapy as necessary.
9. If the patient has cardiovascular instability, evaluate cardiac output and effective circulatory volume by invasive monitoring, and measure serum electrolyte concentrations.
10. Evaluate and treat renal function and cerebral status as indicated.

Glucocorticoid therapy, prophylactic antibiotic therapy, and monitoring of intracranial pressure are no longer recommended [14].

Accident prevention. For those victims in whom the accident is secondary to a medical condition, as in persons susceptible to syncope or seizure, the only way to prevent the accident is to identify those who ought to avoid the water or to encourage them to use the buddy system. For young children, early swimming lessons, vigilant caretakers, and stringent laws governing pool enclosures are needed. Those who teach parenting classes should routinely warn parents about the risk of toddlers' drowning in such household fixtures as toilets, buckets of water, and even washing machines. Preventing accidents during boating, athletics and other water-related recreational activities requires public education. Rules associated with these activities to maximize safety and judicious, responsible behavior should be portrayed as life-saving measures. Similarly, drinking alcohol,

a "ubiquitous catalyst" to drowning, should be portrayed as life-threatening whenever water is nearby.

ELECTRICAL INJURIES

Epidemiology. The exact incidence of electrical injury is unknown. The prevalence of electrical technology in modern society has resulted in more people experiencing electrical injury. The current treatment of electrical injury has resulted in a low mortality, ranging 3–15%, but the amputation rate remains high, and disfigurement due to extensive soft tissue destruction is frequent. More than 60% of the electricity-related fatalities occur in males, with the highest incidence among those 20 to 34 years of age. Approximately one-third of ***high-voltage*** injuries occur in electrical workers, one-third in construction workers, and the remainder from non-work-related events. One-half of ***low-voltage*** injuries occur at home, most of them to young children. Bum center referral is usually necessary for electrical burns [2].

Pathophysiology. Electrical burns result from the conversion of electrical energy into heat. Factors that determine the severity and distribution of injury include the type of current (direct or alternating), the quantity of the current (amperage), the potential of the current (voltage), the resistance offered by the body, the pathway of the current, and the duration of contact. These variables are interrelated, and their interactions produce the varied spectrum of injury seen clinically.

Direct and alternating current have different effects. At low voltages (<1000 V), the low-frequency (40-150 Hz) alternating current range, which is used almost exclusively for incandescent lighting and appliances, is three times more dangerous than direct current. Immediate death can result from ventricular fibrillation, central respiratory arrest, or asphyxia due to tetanic respiratory muscle contractions. Tetanic muscle spasms, which freeze the contact point to the power source, tend to increase the flow of current and the severity of injury. Cutaneous burns may be entirely absent or minimal. In contrast, at high voltages, high-frequency alternating current and direct current are equally lethal [20].

Survivals from electric shock of greater than 100 000 V and deaths from as little as 50 V have occurred, which underscores the interplay of the variables already noted. Clinically, the severity of injury relates primarily to the voltage. Low-voltage contact, while potentially lethal, does not result in the magnitude of tissue necrosis seen with high-voltage injury. Tissue resistance is an important factor in determining both the initiation of current flow and its subsequent path. A person completing a circuit between two contact points has a resistance that is the sum of the skin resistances at both contact points plus the internal body resistance. If skin resistance is high, there will be considerable local tissue destruction. Conversely, if skin resistance is low, systemic effects, such as those on the heart and brain, predominate. Skin resistance varies widely according to the thickness, cleanliness, and wetness of the skin. The resistance of skin in water is only about 0.1% of the resistance of dry skin. The extent of tissue damage can be explained by the differing resistances of various tissues. Listed in the order of increasing magnitude of resistance are nerves, blood vessels, muscle, skin, tendon, fat, and bone [14].

All tissues and organs can be affected by electrical injury. The cutaneous burns are often limited, with variable deep tissue damage. Appreciation of this special property of electrical wounds is critical in their management. Skin wounds are typically leathery or charred areas of full-thickness skin loss. The entry and exit sites are usually depressed; giving the appearance that current exploded the tissues. The arc burn is produced by current coursing external to the body from contact to ground, favoring a path of least resistance. The flexor surfaces of the wrist, elbow, and axilla are most often involved, because the hand is the most commonly involved body part. After several days, the demarcation between viable and nonviable tissue becomes more obvious. Flame burns of the skin may result from ignition of clothing by electrical arcing and may be full-thickness burns because of the prolonged exposure of the dazed victim to the flame [2].

The most severe cardiopulmonary manifestations occur at the time of the injury. These include anoxia and ventricular fibrillation, which may cause

immediate death due to respiratory or cardiac arrest. Major electrical injury is accompanied by a 3-15% incidence of acute renal failure, which is greater than the incidence after thermal burns.

Nervous tissue is highly susceptible to electrical injury because of its low resistance. Neurologic deficits can be seen initially or up to 3 years later, and neurologic aberrations are the most frequent nonfatal sequelae of electrical injury. An important diagnostic point is to ask the patient if the details of the accident are remembered. An inability to recall recent events indicates that electricity entered the body, erasing recent memory. Lesions of the central nervous system may cause varying levels of consciousness and respiratory and motor paralysis, which are usually transient; recovery is the rule. If the effects are permanent, they often assume the character of cortical encephalopathy or hemiplegia with or without aphasia. Spinal cord damage is the most common permanent sequela of electrical injury and is seldom complete. Many deficits seen initially resolve spontaneously; others may not develop until 6 to 9 months after the electrical injury. Permanent deficits may not be seen for days to months, are of gradual onset, and progress slowly. Often these disturbances are not noted until the rehabilitative phase of recovery, when gait abnormalities become evident. Peripheral nerves may be burned directly or may be compressed by surrounding edema or scar tissue. Neuropathies also can develop in unbumed limbs. Autonomic nervous system dysfunction may be seen in both the acute and recovery phases. Reflex sympathetic dystrophy or causalgia can occur. Late onset of burning pain, frequently associated with vasomotor, trophic, and dermal changes, is characteristic [2].

Cataracts characteristically occur following high-voltage injuries. The incidence of these lesions, which are usually bilateral, may be as great as 30% when electrical contact is made above the clavicles, particularly when the entry wound is on the head. The latent period between the accident and the onset of blurred vision averages 6 months (ranges from a few weeks to 3 years).

Direct vascular injury is more common after electrical injury than after any other type of burn. The blood flow in large arteries and veins is usually sufficient to dissipate the heat generated by the electric current. However, smaller vessels may experience significant heat- related damage, resulting in thrombosis. Direct vascular injury probably contributes to the high amputation rate after high-voltage electrical injury. Delayed hemorrhage from mural necrosis of large blood vessels also may occur [17].

Associated injury in electrical accidents can be due to falls of considerable distance or to the explosive effects of the current. Fractures of the vertebrae and long bones and dislocations also may result from the violent tetanic muscle contractions.

Treatment. At the scene of the accident, the patient must be separated immediately from the electric current, but rescuers must not touch or approach the patient until the current has been shut off to avoid injury to themselves. Flames should then be extinguished.

Cardiopulmonary support must be initiated if necessary and maintained during transport. Aggressive life support is essential, because victims of high-voltage electrical injury may be resuscitated successfully without permanent neurologic damage even after a prolonged cessation of vital functions. Because blunt trauma and skeletal injury may both coexist, a thorough history and careful physical examination are essential. Accurate assessment of the extent and nature of the burns is essential to the determination of subsequent therapy. Neurologic status must be evaluated repeatedly during convalescence because it changes frequently.

Fluid replacement is essential in the initial management. Hypovolemia results from the rapid loss of fluid into damaged tissues. Small entry and exit wounds may lead to underestimation of the underlying injury, so fluid requirements may be grossly underestimated. Ringer's lactate should be infused rapidly (0,5 to 1 mL/kg per hour) as necessary to correct hypovolemia and to maintain urinary output. Large volumes of fluid are necessary in high-voltage injury because the fluid and electrolyte needs are much greater than in patients

with thermal burns of equivalent surface area. The adequacy of resuscitation is monitored, with urinary output being the single most reliable indicator of circulatory status. The presence of urinary hemoglobin and myoglobin necessitates treatment with mannitol, and the urine should be made alkaline to prevent precipitation of these pigments in the kidney. When hemoglobinuria and/or myoglobinuriais present, the rate and volume of the crystalloid infusion must be sufficient to maintain a minimum urine output of 100 mL/h. This infusion is continued until the urine is grossly clear of pigment. Red blood cell transfusion, plasma, dextran, or other plasma expanders are unnecessary during the acute resuscitative phase [11].

Low-Voltage Injury related to household appliances, are usually small and limited to the area of contact. These burns frequently involve the hands, feet, or, in children, the corners of the mouth, lips, and tongue. The evolution of tissue injury and vascular necrosis from the current itself are complete within 7 to 10 days. During this time the wounds are allowed to slough and heal by contracture. Small but deep contact injuries on the trunk and extremities may be excised and grafted as necessary when the extent of the slough is evident. Early excision and local flap repair are rarely indicated. Delayed bleeding from the lip, seen in one-quarter of these injuries, is usually readily controlled by direct pressure.

High-Voltage Injury with devitalized skin, fat, and muscle are fundamentally surgical problems. They usually involve a limited amount of the total body surface, have upper-extremity contact points, and require amputation or other surgical procedures. They may affect any organ system. The ultimate treatment goals are stabilization of the patient, salvage of the limb, debridement of devitalized tissue, wound coverage, and rehabilitation. Prolonged expectant nonsurgical therapy only increases the risk of invasive infection [11].

The timing of surgical debridement and its aggressiveness are controversial issues. Opinions range from early total excision with primary wound closure to the now outmoded expectant non-surgical approach. Most surgeons favor an intermediate approach, individualizing according to the amount of tissue

destruction and the location and type of the injury. Major amputations and surgical debridement are usually performed 2 to 4 days following injury, when the extent of necrosis is reasonably well defined but the risk of significant infection is small. During this interval, neurologic and cardiopulmonary abnormalities usually stabilize or resolve, and the demarcation between viable and nonviable tissues becomes more evident. Because these wounds are prone to anaerobic infection, particularly myonecrosis with Clostridia, aqueous penicillin is given prophylactically from the time of admission until debridement is complete. Antibiotic administration should be further guided by identification of infecting organisms. Local wound care is started immediately and includes mechanical cleansing followed by the application of topical antibacterial agents and cotton gauze dressings. Silver sulfadiazine cream has excellent antibacterial activity but penetrates only a few millimeters into the tissues. Sulfamylon, a burn cream containing mafenid (a carbonic anhydrase inhibitor that readily penetrates soft tissue), may be advantageous in deep injuries and, therefore, is the topical agent of choice in the prevention and/or treatment of deep-seated infections. However, when absorbed, this drug causes a bicarbonate diuresis resulting in systemic acidosis [2].

High-voltage electrical burns frequently produce muscle compartment syndromes requiring fasciotomy. Circumferential deep limb burns due to associated flame or arc burns also may require escharotomy or fasciotomy. Indications for surgical decompression include loss of distal pulses, impaired capillary filling, paresthesia, and rigid muscle compartments. Decompression of the carpal tunnel is especially important owing to the high incidence of electrical injury to hands. If done expeditiously, this procedure may save a hand.

Coverage of open wounds usually requires skin grafting. Deep electrical injuries frequently result in complex soft tissue wounds, which may require skin flaps for coverage. Nutritional support is essential and should be instituted early. As with other types of burns, appropriate splints should be fashioned and applied, and an aggressive program of physical therapy should be formulated and instituted.

Psychological counseling is usually beneficial for patients who require a major amputation or other mutilating surgical procedure [2].

TESTS FOR SELF-CONTROL

1. The first measure in the case of electrical current injury is:

A. defibrillation
B. disconnect the victim from the strum source
C. cardio-pulmonary resuscitation
D. Ensure patency of the respiratory tract
E. Apply an aseptic bandage to the burns

2. The death reason in the case of a lightning strike injury is:

A. Primary stop breathing
B. Thermal injury
C. Hyperpotassemia
D. Heart standstill
E. Disorder of central nervous system

3. The woman of 32 years old used faulty electrical appliance. She was fallen unconscious with seizure. Which heart rhythm disturbance most likely will be marked on an electrocardiogram?

A. Paroxysmal tachycardia
B. asystole
C. mechanical electrodissociation of ventricles
D. AV block
E. Atrial fibrillation

4. The patient of 32 years oldwas admitted to the emergency room with electrical injury. Clinical exam: clear conscious, on the skin of right hand – burn, BP 110/70

mmHg, heart rate 82 per min, breathing rate 16 per min. Which department has to be admitted this patient?

A. Cardiology
B. intensive care
C. burnt
D. neurological
E. doesn’t need of admission

5. After summer agricultural work the 40 years old man wasinjured by lightning strike. Breathing rate – 8 per min, heart rate – 60 per min.Which will be emergency in this case?

A. analeptic drug
B. atropine
C. adrenaline
D. artificial lung ventilation
E. electrical defibrillation

6. The result of fresh water drowning may be:

A. hypovolemia
B. hypernatriemia
C. hemolysis
D. hypoproteinemia
E. liver failure

7. The girl of 18 years old was trained in the fresh water. Sudden she had seizure, fainting, and she started to going under water.She was saved. Clinical exam: unconscious, pale skin, dilatated pupils, no carotid pulsation, no breathing. Which will be emergency in this case?

A. emergency call
B. artificial lung ventilation, indirect heart massage

C. ensuring the patency of the respiratory tract

D. IV diuretics

E. intensive care admission

8. The boy of 16 years old was saved in the sea by his friends. He was without signs of life: pale skin, no movement, no carotid pulsation, no breathing. his friends provided emergency: one was rubbing the skin, other pressed by right hand to the chest, third performed mouth-to-mouth breathing. They saw that after each breathing the abdomen was enlarged, the chest didn't elevated. Which was the reason of such condition?

A. artificial lung ventilation with positive inspiration pressure

B. Ascites

C. Gastric cardiac sphincter failure

D. Obstruction of the upper respiratory tract

E. Weakness of abdominal muscles

9. In the sea the man of 54 years old was drowned. He was saved. Clinical exam: unconscious, pale face, no breathing, weak peripheral pulsation. The resuscitation was successful. Which can be early complication?

A. heart arrest

B. breathing standstill

C. encephalopathy

D. pulmonary edema

E. acute pulmonary insufficiency

10. The person of 45-50 years old was drowned. He was saved after 3-4 min. Clinical exam: fainted, cyanotic skin, swollen veins of neck and extremities. There was pink sparkle from the mouth and nose. Which is the preliminary diagnosis?

A. asphyxia drowning

B. active drowning

C. dry drowning

D. syncopal drowning

E. wet drowning

11. What factors affect the outcome of a person's electric shock?

A. Serviceability of the electrical installation.

B. Individual properties of person.

C. Protective earthing.

D. All listed factors.

12.In case of electric shock, if there is no cardiac and pulmonary arrest first of all, it is necessary to do the following on the first place:

A. to create rest for the victim and to examine him;

B. stop the electric current on the victim;

C. take measures to bring the victim to a medical facility or call an ambulance;

D. give the patient an analgesic and cardiac remedy

13. In what way can the electric current on the victim can be terminated:

A. discard the electric wire from the person with one hand;

B. throw the wire away from the victim with both hands;

C. wind a rag onto your arm and quickly throw away the wire;

D. throw the wire away with a dry stick.

14. The main cause of death in case of damage to household electricity:

A. Ventricular fibrillation.

B. Incompatible loss of blood.

C. Incompatible with life injuries.

D. Atrial fibrillation

15. Which of the following improvised means it is better to use to dump an electric wire from the unconscious person on the floor in his apartment:

A. Dry the handle of a mop brought from a bathroom or the toilet.

B. Dry home slipper, removed from his leg.

C. A dry wooden stick brought from the yard.

D. All of the above can be used

16. State the first step of a sequence of actions when providing first aid to an electric shock victim who lies unconscious in the bath:

A. Release the water from the bath.

B. Enter the bathroom and turn off all electrical appliances from the network.

C. Assess the condition and proceed to cardiopulmonary resuscitation.

D. To call an ambulance brigade.

17. State the first step of a sequence of actions when providing first aid to the victim, lying unconscious under electric wire of urban lighting on a lawn near walking trail:

A. Discard the wire with any non-conductive object.

B. Assess the condition of the victim and, in the absence pulse on the carotid artery, apply a blow to the chest.

C. To drag the victim to 3-4 meters away from the wire lying on ground and arrange it on a pedestrian path,free of grass.

D. Ask others to call an ambulance.

18. Patients with electrical injuries after getting the emergency medical help:

A. should visit their family doctor

B. do not need further examination and treatment

C. should be hospitalized by the ambulance

D. should be examined by the neurologist

19. When drowning in cold water, the duration of clinical death:

A. is shortened

B. is extended

C. does not change

D. depends on a person

20. For electrical injuries of the 1st degree of severity it is typical:

A. loss of consciousness

B. respiratory and circulatory disorders

C. convulsive muscle contraction

D. clinical death

1	2	3	4	5	6	7	8	9	10
B	**D**	**E**	**B**	**D**	**C**	**B**	**D**	**D**	**E**
11	12	13	14	15	16	17	18	19	20
A	**B**	**D**	**A**	**D**	**B**	**A**	**C**	**B**	**C**

EMERGENCY IN THE CASE OF FROSTBITE AND THERMAL INJURY IN THE PRACTICE OF FAMILY DOCTOR

I. Theme actuality. A **burn** is a type of injury to skin, or other tissues, caused by heat, cold, electricity, chemicals, friction, or radiation. Most deaths due to burns occur in the developing world, particularly in Southeast Asia. While large burns can be fatal, treatments developed since 1960 have improved outcomes, especially in children and young adults. Burns are generally preventable. Treatment depends on the severity of the burn. The long-term outcome also is related to the size of burn and the age of the person affected

Frostbite has been described in military history for millennia. There is a lack of comprehensive statistics about the epidemiology of frostbite. Research suggests that men aged 30–49 are at highest risk, possibly due to occupational or recreational exposures to cold. People who are exposed to cold temperatures for prolonged periods are at greatest risk of frostbite, such as winter sports enthusiasts, military personnel, and homeless individuals. People with poor circulation of blood or ability to seek shelter are also at increased risk. Specifically this includes drinking alcohol, smoking, mental health problems, certain medications, and prior injuries due to cold. Cold temperatures cause blood vessels to narrow, slowing the flow of warm blood from the core of the body to the extremities. With prolonged exposure to cold, ice crystals form in tissues. These ice crystals, in turn, damage cells and blood vessels. Specific tests are not typically required for diagnosis; the person's history and physical exam are sufficient. Frostnip, chilblains (pernio), and trench foot can look similar to frostbite[2].

II. Study purposes: to assess patient’s condition and to provide emergency in the case of heat and cold impact in the practice of family doctor. To know the principles of interrelation with secondary and tertiary health care setting.

III. The practical skills :to know the classification, clinical presentation and emergency algorithm in the case of thermal burns, frostbite, heat stroke and overcooling.

IV. The basic terms and notions, which have to be known by students:

A **burn** is a type of injury to skin, or other tissues, caused by heat, cold, electricity, chemicals, friction, or radiation. Most burns are due to heat from hot liquids, solids, or fire. While rates are similar for males and females the underlying causes often differ. Among women in some areas, risk is related to use of open cooking fires or unsafe cook stoves. Among men, risk is related to the work environments. Alcoholism and smoking are other risk factors. Burns can also occur as a result of self harm or violence between people.

Hyperthermia is elevated body temperature due to failed thermoregulation that occurs when a body produces or absorbs more heat than it dissipates. Extreme temperature elevation then becomes a medical emergency requiring immediate treatment to prevent disability or death. The most common causes include heat stroke and adverse reactions to drugs. The former is an acute temperature elevation caused by exposure to excessive heat, or combination of heat and humidity, that overwhelms the heat-regulating mechanisms. The latter is a relatively rare side effect of many drugs, particularly those that affect the central nervous system. Malignant hyperthermia is a rare complication of some types of general anesthesia.

Hypothermia is reduced body temperature that happens when a body dissipates more heat than it absorbs. In humans, it is defined as a body core temperature below 35.0 °C (95.0 °F).Symptoms depend on the temperature. In mild hypothermia there is shivering and mental confusion. In moderate hypothermia shivering stops and confusion increases. In severe hypothermia, there may be paradoxical undressing, in which a person removes his or her clothing, as well as an increased risk of the heart stopping.

Frostbite is when exposure to cold temperatures causes freezing to the skin or other tissues. It most commonly affects the hands, feet, and face. The longer areas are exposed to cold, typically the worse the frostbite. Frostbite is classified

by degrees of severity, with first degree being superficial damage to surface skin and fourth degree involving bone, muscle and tendon. It results in irreversible damage.

V. The content of theme

A **burn** is a type of injury to skin, or other tissues, caused by heat, cold, electricity, chemicals, friction, or radiation.

The characteristics of a burn depend upon its depth. Superficial burns cause pain lasting two or three days, followed by peeling of the skin over the next few days. Individuals suffering from more severe burns may indicate discomfort or complain of feeling pressure rather than pain. Full-thickness burns may be entirely insensitive to light touch or puncture. While superficial burns are typically red in color, severe burns may be pink, white or black. Burns around the mouth or singed hair inside the nose may indicate that burns to the airways have occurred, but these findings are not definitive. More worrisome signs include: shortness of breath, hoarseness, and stridor or wheezing. Itchiness is common during the healing process, occurring in up to 90% of adults and nearly all children. Numbness or tingling may persist for a prolonged period of time after an electrical injury. Burns may also produce emotional and psychological distress [2].

Classification of burns

Type	Layers involved	Appearance	Texture	Sensation	Healing Time	Prognosis
Superficial (1st-degree)	Epidermis	Red without blisters	Dry	Painful	5–10days	Heals well. Repeated sunburns increase the risk of skin cancer later in life.
Superficial partial thickness	Extends into superficial (papillary)	Redness with clearblister.Blanches with	Moist	Very painful	less than 2–3 weeks	Local infection (cellulitis) but

(2nd-degree)	dermis	pressure.				no scarring typically
Deep partial thickness (2nd-degree)	Extends into deep (reticular) dermis	Yellow or white. Less blanching. May be blistering.	Fairly dry	Pressure and discomfort	3–8weeks	Scarring, contractures (may require excision and skin grafting)
Full thickness (3rd-degree)	Extends through entire dermis	Stiff and white/brown. No blanching.	Leathery	Painless	Prolonged (months) and incomplete	Scarring, contractures, amputation (early excision recommended)
4th-degree	Extends through entire skin, and into underlying fat, muscle and bone	Black; charred witheschar	Dry	Painless	Requires excision	Amputation, significant functional impairment, and, in some cases, death.

To determine the need for referral to a specialized burn unit, the American Burn Association devised a classification system. Under this system, burns can be classified as major, moderate and minor. This is assessed based on a number of factors, including total body surface area affected, the involvement of specific anatomical zones, the age of the person, and associated injuries. Minor burns can typically be managed at home, moderate burns are often managed in hospital, and major burns are managed by a burn center [14].

Minor	Moderate	Major
Adult <10% TBSA	Adult 10–20% TBSA	Adult >20% TBSA
Young or old < 5% TBSA	Young or old 5–10% TBSA	Young or old >10% TBSA
<2% full thickness burn	2–5% full thickness burn	>5% full thickness burn

	High voltage injury	High voltage burn
	Possible inhalation injury	Known inhalation injury
	Circumferential burn	Significant burn to face, joints, hands or feet
	Other health problems	Associated injuries

Cause. Burns are caused by a variety of external sources classified as thermal (heat-related), chemical, electrical, and radiation. The most common causes of burns are: fire or flame (44%), scalds (33%), hot objects (9%), electricity (4%), and chemicals (3%).Most (69%) burn injuries occur at home or at work (9%),and most are accidental, with 2% due to assault by another, and 1–2% resulting from a suicide attempt. These sources can cause inhalation injury to the airway and/or lungs, occurring in about 6% [11].

Burn injuries occur more commonly among the poor. Smoking and alcoholism are other risk factor .Fire-related burns are generally more common in colder climates. Specific risk factors in the developing world include cooking with open fires or on the floor as well as developmental disabilities in children and chronic diseases in adults

The size of a burn is measured as a percentage of total body surface area (TBSA) affected by partial thickness or full thickness burns. First-degree burns that are only red in color and are not blistering are not included in this estimation. Most burns (70%) involve less than 10% of the TBSA.

There are a number of methods to determine the TBSA, including the Wallace rule of nines, Lund and Browder chart, and estimations based on a person's palm size.The rule of nines is easy to remember but only accurate in people over 16 years of age.More accurate estimates can be made using Lund and Browder charts, which take into account the different proportions of body parts in adults and children.The size of a person's handprint (including the palm and fingers) is approximately 1% of their TBSA [11].

Emergency. Resuscitation begins with the assessment and stabilization of the person's airway, breathing and circulation. If inhalation injury is suspected, early intubation may be required. This is followed by care of the burn wound itself. People with extensive burns may be wrapped in clean sheets until they arrive at a hospital. As burn wounds are prone to infection, a tetanus booster shot should be given if an individual has not been immunized within the last five years. With major burns, early feeding is important. Hyperbaric oxygenation may be useful in addition to traditional treatments [2].

Intravenous fluids. In those with poor tissue perfusion, boluses of isotonic crystalloid solution should be given. In children with more than 10–20% TBSA burns, and adults with more than 15% TBSA burns, formal fluid resuscitation and monitoring should follow. This should be begun pre-hospital if possible in those with burns greater than 25% TBSA. The Parkland formula can help determine the volume of intravenous fluids required over the first 24 hours. The formula is based on the affected individual's TBSA and weight. Half of the fluid is administered over the first 8 hours, and the remainder over the following 16 hours. The time is calculated from when the burn occurred, and not from the time that fluid resuscitation began. Children require additional maintenance fluid that includes glucose. Additionally, those with inhalation injuries require more fluid. While inadequate fluid resuscitation may cause problems, over-resuscitation can also be detrimental. The formulas are only a guide, with infusions ideally tailored to a urinary output of >30 mL/h in adults or >1mL/kg in children and mean arterial pressure greater than 60 mmHg [11].

While lactated Ringer's solution is often used, there is no evidence that it is superior to normal saline. Crystalloid fluids appear just as good as colloid fluids, and as colloids are more expensive they are not recommended. Blood transfusions are rarely required. They are typically only recommended when the hemoglobin level falls below 60-80 g/L due to the associated risk of complications. Intravenous catheters may be placed through burned skin if needed or intraosseous infusions may be used.

Wound care. Early cooling (within 30 minutes of the burn) reduces burn depth and pain, but care must be taken as over-cooling can result in hypothermia. It should be performed with cool water 10–25 °C and not ice water as the latter can cause further injury. Chemical burns may require extensive irrigation. Cleaning with soap and water, removal of dead tissue, and application of dressings are important aspects of wound care. If intact blisters are present, it is not clear what should be done with them. Some tentative evidence supports leaving them intact. Second-degree burns should be re-evaluated after two days.

In the management of first and second-degree burns, little quality evidence exists to determine which dressing type to use. It is reasonable to manage first-degree burns without dressings. While topical antibiotics are often recommended, there is little evidence to support their use. Silver sulfadiazine (a type of antibiotic) is not recommended as it potentially prolongs healing time. There is insufficient evidence to support the use of dressings containing silver or negative-pressure wound therapy [16].

Medications. Burns can be very painful and a number of different options may be used for pain management. These include simple analgesics (such as ibuprofen and acetaminophen) and opioids such as morphine. Benzodiazepines may be used in addition to analgesics to help with anxiety. During the healing process, antihistamines, massage, or transcutaneous nerve stimulation may be used to aid with itching. Antihistamines, however, are only effective for this purpose in 20% of people. There is tentative evidence supporting the use of gabapentin and its use may be reasonable in those who do not improve with antihistamines. Intravenous lidocaine requires more study before it can be recommended for pain.

Intravenous antibiotics are recommended before surgery for those with extensive burns (>60% TBSA).Do not recommend their general use due to concerns regarding antibiotic resistance and the increased risk of fungal infections. Tentative evidence, however, shows that they may improve survival rates in those with large and severe burns.Erythropoietin has not been found effective to prevent or treat anemia in burn cases.In burns caused by hydrofluoric acid, calcium

gluconate is a specific antidote and may be used intravenously and/or topically. Recombinant human growth hormone in those with burns that involve more than 40% of their body appears to speed healing without affecting the risk of death.

Surgery. Wounds requiring surgical closure with skin grafts or flaps (typically anything more than a small full thickness burn) should be dealt with as early as possible. Circumferential burns of the limbs or chest may need urgent surgical release of the skin, known as anescharotomy. This is done to treat or prevent problems with distal circulation, or ventilation. It is uncertain if it is useful for neck or digit burns.Fasciotomiesmay be required for electrical burns [2].

Frostbite. Areas that are usually affected include cheeks, ears, nose and fingers and toes. Frostbite is often preceded by frostnip. The symptoms of frostbite progress with prolonged exposure to cold. Historically, frostbite has been classified by degrees according to skin and sensation changes, similar to burn classifications. However, the degrees do not correspond to the amount of long term damage. A simplification of this system of classification is superficial (first or second degree) or deep injury (third or fourth degree) [14].

First degree: is superficial, surface skin damage that is usually not permanent.

- Early on, the primary symptom is loss of feeling in the skin. In the numb areas, the skin is numb, and possibly swollen, with a reddened border.
- In the weeks after injury, the skin's surface may slough off.

Second degree: the skin develops clear blisters early on, and the skin's surface hardens.

- In the weeks after injury, this hardened, blistered skin dries, blackens, and peels.
- At this stage, lasting cold sensitivity and numbness can develop.

Third degree: the layers of tissue below the skin freeze [11].

- Symptoms include blood blisters and "blue-grey discoloration of the skin"
- In the weeks after injury, pain persists and a blackened crust (eschar) develops

- There can be long term ulceration and damage to growth plates

Fourth degree: structures below the skins are involved like muscles, tendon, and bone

- Early symptoms include a colorless appearance of the skin, a hard texture, and painless rewarming
- Later, the skin becomes black and mummified. The amount of permanent damage can take one month or more to determine. Autoamputation can occur after two months [2].

Risk factors

The major risk factor for frostbite is exposure to cold through geography, occupation and/or recreation. Inadequate clothing and shelter are major risk factors. Frostbite is more likely when the body's ability to produce or retain heat is impaired. Physical, behavioral, and environmental factors can all contribute to the development of frostbite. Immobility and physical stress (such as malnutrition or dehydration) are also risk factors. Disorders and substances that impair circulation contribute, including diabetes, Raynaud's phenomenon, tobacco and alcohol use. Homeless individuals and individuals with some mental illnesses may be at higher at risk.

Frostbite is diagnosed based on signs and symptoms as described above, and by patient history. Other conditions that can have a similar appearance or occur at the same time include:

- Frostnip is similar to frostbite, but without ice crystal formation in the skin. Whitening of the skin and numbness reverse quickly after rewarming.
- Trench foot is damage to nerves and blood vessels that results exposure to wet, cold (non-freezing) conditions. This is reversible if treated early.
- Pernioor chillbains are inflammation of the skin from exposure to wet, cold (non-freezing) conditions. They can appears as various types of ulcers and blisters.
- Bullous pemphigoidis a condition that causes itchy blisters over the body that can mimic frostbite. It does not require exposure to cold to develop [18].

- Levamisole toxicity is a vasculitis that can appear similar to frostbite. It is caused by contamination of cocaine by levamisole. Skin lesions can look similar those of frostbite, but do not require cold exposure to occur.

People who have hypothermia often have frostbite as well .Since hypothermia is life-threatening this should be treated first.Technetium-99 or MRI scans are not required for diagnosis, but might be useful for prognostic purposes.

Pre-hospital care. Individuals with frostbite or potential frostbite should go to a protected environment and get warm fluids. If there is no risk of re-freezing, the extremity can be exposed and warmed in the groin or underarm of a companion. If the area is allowed to refreeze, there can be worse tissue damage. If the area cannot be reliably kept warm, the person should be brought to a medical facility without rewarming the area. Rubbing the affected area can also increase tissue damage. Aspirin and ibuprofen can be given in the field to prevent clotting and inflammation. Ibuprofen is often preferred to aspirin because aspirin may block a subset of prostaglandins that are important in injury repair [2].

Hospital management. The first priority in people with frostbite should be to assess for hypothermia and other life-threatening complications of cold exposure. Before treating frostbite, the core temperature should be raised above 35C. Oral or intravenous (IV) fluids should be given.

Rewarming. If the area is still partially or fully frozen, it should be rewarmed in the hospital with a warm bath with povidone iodine or chlorhexidine antiseptic. Active rewarming seeks to warm the injured tissue as quickly as possible without burning. The faster tissue is thawed, the less tissue damage occurs.It is recommended a temperature of 37°C–39°C, which decreases the pain experienced by the patient whilst only slightly slowing rewarming time." Warming takes 15 minutes - 1 hour. Rewarming can be very painful, so pain management is important [19].

Other considerations for standard hospital management include:

- wound care: blisters can be drained by needle aspiration, unless they are bloody (hemorrhagic). Aloe vera gel can be applied before breathable, protective dressings or bandages are put on.
- antibiotics: if there is trauma, skin infection (cellultitis) or severe injury, antibiotics are indicated.
- tetanus toxoid: should be administered according to local guidelines. Uncomplicated frostbite wounds are not known to encourage tetanus.
- pain control: NSAIDs or opioids are recommended during the painful rewarming process [14].

Thrombolysis. People with potential for large amputations and who present within 24 hours of injury can be given TPA with heparin or enoxaparin. These medications should be withheld if there are any contraindications. Bone scans or CT angiography can be done to assess damage.

Vasodilators. Blood vessel dilating (vasodilating) medications such as iloprost may prevent blood vessel blockage. This treatment might be appropriate in grades 2-4 frostbite, when people get treatment within 48 hours.In addition to vasodilators, sympatholytic drugs can be used to counteract the detrimental peripheral vasoconstriction that occurs during frostbite.

Surgery. Various types of surgery might be indicated in frostbite injury, depending on the type and extent of damage. Debridement or amputation of necrotic tissue is usually delayed unless there is gangrene or systemic infection (sepsis). If symptoms of compartment syndrome develop, fasciotomy can be done to attempt to preserve blood flow [11].

Heat stroke (**sun stroke)**, is a type of severe heat illness that results in a body temperature greater than 40.0 C and confusion. Other symptoms include red, dry or damp skin, headache, and dizziness. Onset can be sudden or gradual. Complications may include seizures, rhabdomyolysis, or kidney failure.

Heat stroke occurs because of high external temperatures or physical exertion. Risk factors include heat waves, high humidity, certain drugs such as diuretics, beta blockers, or alcohol, heart disease, and skin disorders. Cases not

associated with physical exertion typically occur in those at the extremes of age or with long term health problems. Diagnosis is based on symptoms. It is a type of hyperthermia.It is distinct from a fever, where there is a physiological increase in the temperature set point [2].

Preventive measures include drinking sufficient fluids and avoiding excessive heat. Treatment is by rapid physical cooling of the body and supportive care. Recommended methods include spraying the person with water and using a fan, putting the person in ice water, or giving cold intravenous fluids. While it is reasonable to add ice packs around a person, this by itself is not routinely recommended.

The risk of death is less than 5% in those with exercise-induced heat stroke and as high as 65% in those with non-exercise induced cases.

Signs and symptoms

Heat stroke generally presents with a hyperthermia of greater than 40.6 C in combination with disorientation and a lack of sweating. Before a heat stroke occurs, people show signs of heat exhaustion such as dizziness, mental confusion, headaches, and weakness; if a heat stroke occurs when the person is asleep, symptoms may be harder to notice. However, in exertional heat stroke, the affected person may sweat excessively. Young children, in particular, may have seizures. Eventually, unconsciousness, organ failure, and death will result [18].

The risk of heat stroke can be reduced by observing precautions to avoid overheating and dehydration. Light, loose-fitting clothes will allow perspiration to evaporate and cool the body. Wide-brimmed hats in light colors help prevent the sun from warming the head and neck. Vents on a hat will help cool the head, as will sweatbands wetted with cool water. Strenuous exercise should be avoided during daylight hours in hot weather, as should remaining in confined spaces (such as automobiles) without air-conditioning or adequate ventilation [15].

In hot weather, people need to drink plenty of cool liquids to replace fluids lost from sweating. Thirst is not a reliable sign that a person needs fluids. A better indicator is the color of urine. A dark yellow color may indicate dehydration.

The checklist which was designed to help protect from heat stress:

- Know signs/symptoms of heat-related illnesses.
- Block out direct sun and other heat sources.
- Drink fluids often, and *before* you are thirsty.
- Wear lightweight, light-colored, loose-fitting clothes.
- Avoid beverages containing alcohol or caffeine.

Treatment of heat stroke involves rapid mechanical cooling along with standard resuscitation measures [2].

The body temperature must be lowered quickly. The person should be moved to a cool area (indoors, or at least in the shade) and clothing removed to promote heat loss (passive cooling). Active cooling methods should also be used, if possible: The person is bathed in cold water, or a hyperthermia vest can be applied. (However, wrapping the person in wet towels or clothes can actually act as insulation and increase the body temperature.) Cold compresses to the torso, head, neck, and groin will help cool the victim. A fan or dehumidifying air-conditioning unit may be used to aid in evaporation of the water (evaporative method).

Immersing a person into a tub of cold water (immersion method) is a widely recognized method of cooling. This method may require the effort of several people and the person should be monitored carefully during the treatment process. Immersion should be avoided for an unconscious person, but if there is no alternative, the person's head must be held above water [14].

Immersion in very cold water was once thought to be counterproductive by reducing blood flow to the skin and thereby preventing heat from escaping the body core. However, this hypothesis has been challenged in experimental studies, as well as by systematic reviews of the clinical data, indicating that cutaneous vasoconstriction and shivering thermogenesis do not play a dominant role in the decrease in core body temperature brought on by cold water immersion. This can be seen in the effect of submersion hypothermia, where the body temperature decrease is directly related to environmental temperature, and though bodily defenses slow the decrease in temperature for a time, they ultimately fail to

maintain endothermic homeostasis. Dantrolene, a direct-acting paralytic which abolishes shuddering and is effective in many other forms of hyperthermia, including centrally-, peripherally- and cellularly-mediated thermogenesis, has no individual or additive effects to cooling in the context of heat stroke,showing a lack of endogenous thermogenic response to cold water immersion. Thus, aggressive ice-water immersion remains the gold standard for life-threatening heat stroke [11].

Hydration is important in cooling the person. In mild cases of concomitant dehydration, this can be achieved by drinking water, or commercial isotonic sports drinks may be used as a substitute. In exercise- or heat-induced dehydration, electrolyte imbalance can result, and can be worsened by excess consumption of water. Hyponatremia can be corrected by intake of hypertonic fluids. Absorption is rapid and complete in most people but if the person is confused, unconscious, or unable to tolerate oral fluid, then an intravenous drip may be necessary for rehydration and electrolyte replacement.

The person's condition should be reassessed and stabilized by trained medical personnel. The person's heart rate and breathing should be monitored, and CPR may be necessary if the person goes into cardiac arrest [8].

Hypothermia is reduced body temperature that happens when a body dissipates more heat than it absorbs. In humans, it is defined as a body core temperature below 35.0°C. Symptoms depend on the temperature. In mild hypothermia there is shivering and mental confusion. In moderate hypothermia shivering stops and confusion increases. In severe hypothermia, there may be paradoxical undressing, in which a person removes his or her clothing, as well as an increased risk of the heart stopping.

Hypothermia is often defined as any body temperature below 35.0°C.With this method it is divided into degrees of severity based on the core temperature.

Another classification system, the Swiss staging system, divides hypothermia based on the presenting symptoms which is preferred when it is not possible to determine an accurate core temperature [1].

Other cold-related injuries that can be present either alone or in combination with hypothermia include:

- Chilblains: superficial ulcers of the skin that occur when a predisposed individual is repeatedly exposed to cold
- Frostbite: the freezing and destruction of tissue
- Frostnip: a superficial cooling of tissues without cellular destruction
- Trench foot or immersion foot: a condition caused by repetitive exposure to water at non-freezing temperatures

The normal human body temperature is often stated as 36.5–37.5°C.Hyperthermia and fever, are defined as a temperature of greater than 37.5–38.3°C.

Signs and symptoms. Signs and symptoms vary depending on the degree of hypothermia, and may be divided by the three stages of severity. Infants with hypothermia may feel cold when touched, with bright red skin and an unusual lack of energy [14].

Mild. Symptoms of mild hypothermia may be vague, with sympathetic nervous system excitation (shivering, high blood pressure, fast heart rate, fast respiratory rate, and contraction of blood vessels). These are all physiological responses to preserve heat. Increased urine production due to cold, mental confusion, and hepatic dysfunction may also be present. Hyperglycemia may be present, as glucose consumption by cells and insulin secretion both decrease, and tissue sensitivity to insulin may be blunted. Sympathetic activation also releases glucose from the liver. In many cases, however, especially in alcoholic patients, hypoglycemia appears to be a more common presentation. Hypoglycemia is also found in many hypothermic patients, because hypothermia may be a result of hypoglycemia [11].

Moderate. Low body temperature results in shivering becoming more violent. Muscle mis-coordination becomes apparent. Movements are slow and labored, accompanied by a stumbling pace and mild confusion, although the person may appear alert. Surface blood vessels contract further as the body focuses its

remaining resources on keeping the vital organs warm. The subject becomes pale. Lips, ears, fingers, and toes may become blue.

Severe. As the temperature decreases, further physiological systems falter and heart rate, respiratory rate, and blood pressure all decrease. This results in an expected heart rate in the 30's at a temperature of 28 C [2].

Difficulty speaking, sluggish thinking, and amnesia start to appear; inability to use hands and stumbling are also usually present. Cellular metabolic processes shut down. Below 30 C, the exposed skin becomes blue and puffy, muscle coordination very poor, and walking or even stupor. Pulse and respiration rates decrease significantly, but fast heart rates (ventricular tachycardia, atrial fibrillation) can also occur. Atrial fibrillation is not typically a concern in and of itself. Major organs fail and clinical death occurs.

Paradoxical undressing. Twenty to fifty percent of hypothermia deaths are associated with paradoxical undressing. This typically occurs during moderate and severe hypothermia, as the person becomes disoriented, confused, and combative. They may begin discarding their clothing, which, in turn, increases the rate of heat loss.

Rescuers who are trained in mountain survival techniques are taught to expect this; however, people who die from hypothermia in urban environments are sometimes incorrectly assumed to have been subjected to sexual assault.

One explanation for the effect is a cold-induced malfunction of the hypothalamus, the part of the brain that regulates body temperature. Another explanation is that the muscles contracting peripheral blood vessels become exhausted (known as a loss of vasomotor tone) and relax, leading to a sudden surge of blood (and heat) to the extremities, causing the person to feel overheated [23].

Terminal burrowing. An apparent self-protective behaviour, known as "terminal burrowing", or "hide-and-die syndrome", occurs in the final stages of hypothermia. The afflicted will enter small, enclosed spaces, such as underneath beds or behind wardrobes. It is often associated with paradoxical undressing. Researchers in Germany claim this is "obviously an autonomous process of the

brain stem, which is triggered in the final state of hypothermia and produces a primitive and burrowing-like behavior of protection, as seen in hibernating animals."This happens mostly in cases where temperature drops slowly

Hypothermia usually occurs from exposure to low temperatures, and is frequently complicated by alcohol consumption. Any condition that decreases heat production, increases heat loss, or impairs thermoregulation, however, may contribute. Thus, hypothermia risk factors include: substance abuse(including alcohol abuse),homelessness, any condition that affects judgment (such as hypoglycemia), the extremes of age, poor clothing, chronic medical conditions (such as hypothyroidism and sepsis), and living in a cold environment. Hypothermia occurs frequently in major trauma, and is also observed in severe cases of anorexia nervosa [14].

Pathophysiology. Heat is primarily generated in muscle tissue, including the heart, and in the liver, while it is lost through the skin (90%) and lungs (10%).Heat production may be increased two- to four-fold through muscle contractions (i.e. exercise and shivering).The rate of heat loss is determined, as with any object, by convection,conduction, and radiation. The rates of these can be affected by body mass index, body surface to volume ratios, clothing and other environmental conditions.

Many changes to physiology occur as body temperatures decrease. These occur in the cardiovascular system leading to the Osborn J wave and other dysrhythmias, decreased central nervous system electrical activity, cold diuresis, and non-cardiogenic pulmonary edema.

The glomerular filtration rates (GFR) decrease as a result of hypothermia. In essence, hypothermia increases preglomerular vasoconstriction, thus decreasing both renal blood flow (RBF) and GFR [18].

Diagnosis

Accurate determination of core temperature often requires a special low temperature thermometer, as most clinical thermometers do not measure accurately below 34.4 °C.A low temperature thermometer can be placed in the rectum,

esophagus or bladder. Esophageal measurements are the most accurate and are recommended once a person is intubated. Other methods of measurement such as in the mouth, under the arm, or using an infra red ear thermometer are often not accurate.

As a hypothermic person's heart rate may be very slow, prolonged feeling for a pulse could be required before detecting. The American Heart Associati on recommended at least 30–45 seconds to verify the absence of a pulse before initiating CPR. Others recommend a 60-second check [11].

The classical ECG finding of hypothermia is the Osborn J wave. Also,ventricular fibrillation frequently occurs below 28°C and a systole below 20°C. The Osborn J may look very similar to those of an acute ST elevation myocardial infarction. Thrombolysis as a reaction to the presence of Osborn J waves is not indicated, as it would only worsen the underlying coagulopathy caused by hypothermia

Aggressiveness of treatment is matched to the degree of hypothermia. Treatment ranges from noninvasive, passive external warming to active external rewarming, to active core rewarming.In severe cases resuscitation begins with simultaneous removal from the cold environment and management of the airway, breathing, and circulation. Rapid rewarming is then commenced. Moving the person as little and as gently as possible is recommended as aggressive handling may increase risks of a dysrhythmia.

Hypoglycemia is a frequent complication and needs to be tested for and treated. Intravenous thiamine and glucose is often recommended, as many causes of hypothermia are complicated by Wernicke's encephalopathy [2].

The UK National Health Serviceadvises the lay public against putting a person in a hot bath, massaging their arms and legs, using a heating pad, or giving them alcohol. These measures can cause blood to be directed to the skin, causing a fall in blood pressure to vital organs, potentially resulting in death.

Rewarming can be done with a number of methods including passive external rewarming, active external rewarming, and active internal rewarming.

Passive external rewarming involves the use of a person's own ability to generate heat by providing properly insulated dry clothing and moving to a warm environment. It is recommended for those with mild hypothermia [17].

Active external rewarming involves applying warming devices externally, such as a heating blanket. These may function by warmed forced air (Bair Huggeris a commonly used device), chemical reactions, or electricity. In wilderness environments, hypothermia may be helped by placing hot water bottles in both armpits and in the groin. These methods are recommended for moderate hypothermia. Active core rewarming involves the use of intravenous warmed fluids, irrigation of body cavities with warmed fluids (the chest or abdomen), use of warm humidified inhaled air, or use of extracorporeal rewarming such as via a heart lung machine or extracorporeal membrane oxygenation (ECMO).Extracorporeal rewarming is the fastest method for those with severe hypothermia. Survival rates with normal mental functioning have been reported at around 50%.Chest irrigation is recommended if bypass or ECMO is not possible.

Rewarming shock is a sudden drop in blood pressure in combination with a low cardiac output which may occur during active treatment of a severely hypothermic person. There was a theoretical concern that external rewarming rather than internal rewarming may increase the risk. These concerns were partly believed to be due to after drop, a situation detected during laboratory experiments where there is a continued decrease in core temperature after rewarming has been started [22].

Fluids. Warm sweetened liquids can be given provided the person is alert and can swallow. Many recommend that alcohol and drinks with lots of caffeine be avoided. As most people are moderately dehydrated due to cold-induced diuresis, warmed intravenous fluids to a temperature of 38–45°C are often recommended.

Cardiac arrest. In those without signs of life cardiopulmonary resuscitation(CPR) should be continued during active rewarming. For ventricular fibrillation or ventricular tachycardia, a single defibrillation should be attempted. People with severe hypothermia however may not respond to pacing or

defibrillation. It is not known if further defibrillation should be withheld until the core temperature reaches 30°C.In Europe epinephrine is not recommended until the temperature reaches 30°C, while the American Heart Association recommended up to three doses of epinephrine before 30°C is reached. Once a temperature of 30°C is reached, normal ACLS protocols should be followed [2].

TESTS FOR SELF-CONTROL:

1. After hot summer day the women of 60 year old felt headache, tinnitus, weakness. Clinical examination: hyperemic face, body temperature $38,2^0$C, heart rate – 110 per min, BP 105/70 mmHg. The working diagnosis is:

A. collapse

B. heat stroke

C. sympathetic crisis

D. flu

E. vagal crisis

2. After agricultural work in the summer day the man of 40 year old felt weakness, dizziness, dry mouth. Clinical examination: hyperemic hot skin, body temperature $37,1^0$C, heart rate – 125 per min, BP 150/90 mmHg, breathing rate – 24 per min, muffled heart tones, decreased diuresis. Which will be emergency?

A. hydratation, moist wipping

B. dehydratation, antipyretic drug

C. diuretics, analgetics

D. cardiotonic drug, lasics

E. desensibilazing therapy

3. The girl of 16 year old was fainted after standing in the sunny day. Clinical examination: pale skin, heart rate – 96 per min, BP 70/50 mmHg, normal heart tones, vesicular breathing. Which will be emergency?

A. siting position

B. supine position with elevated legs

C. electrical defibrillation

D. IV glycosides

E. IV dexamethasone

4. The patient of 40 years old had abdominal wall and thighs burn of 2nd degree. Which is clinical presentation of 2nd degree burn?

A. hyperemia

B. swelling

C. vesicles with yellow fluid

D. empty vesicles with hemorrhage fluid

E. necrosis of tissue

5. The victim of 50 years old was found in the basement. He was obtunded, with decreased critics, with bad breath. Language was scanned, movements were limited. Clinical examination: pale skin, breathing rate– 16 per min, muffled heart tones, heart rate 60 per min, BP 150/90 mmHg, body temperature - 35,3°C. Which is the working diagnosis?

A. mild hypothermia

B. moderate hypothermia

C. severe hypothermia

D. alcohol abuse

E. alcohol poisoning

6. The criteria of severe heat stroke is:

A. body temperature $40,5^0$C

B. heart rate 130 per min

C. decreased muscle tonus

D. body temperature $39,5^0$C

E. heart rate 120 per min

7. In the case of thermal burn the share of skin damage is estimated by:

A. rule of Donnald

B. Wallace rule of nines

C. rule of Franck

D. rule of palm

E. rule of thermal shock

8. The victim of overcooling was admitted to the hospital. The rectal temperature is 32^0C. Which is degree of hypothermia?

A. severe

B. mild

C. moderate

D. deep

E. coma

9. The family doctor was called for the home visit. The drunk man of 46 years old was in the cold out-door 2 day ago. He felt burning painful itchy skin, paresthesia of toes. Clinical examination: cyanotic swollen skin of feet, with some vesicles with yellow fluid. The working diagnosis is:

A. frostbite of III degree

B. Crash Syndrome

C. frostbite ofI degree

D. frostbite of IV degree

E. frostbite of II degree

10. The man of 24 years old was admitted to the hospital. In the winter he walked home during 12 hours. Clinical examination: sluggish, "goose skin", mild cyanosis, hypertonic muscles of extremities and body. The working diagnosis is:

A. acute viral infection

B. overcooling

C. hypothermia

D. pneumonia

E. asthenia

11. Burnt surface of the skin should be covered with:

A. bandage with furatsillinum

B. bandage with sintomycin emulsion

C. dry sterile bandage

D. a bandage with a solution of tea soda

12. Cooling of the burnt surface with cold water is indicated:

A. *in the first minutes after the injury

B. only with a 1st degree burn

C. not shown

D. after 1 hour

13. One of the characteristics of the pre-active period of the frostbite is:

A.lack of skin sensitivity

B. pain

C. skin hyperemia

D. edema

14. What is the extent to which infusion therapy is performed during the therapy of the victim with burn shock?

A. 30 ml / h.

B.20 ml / h

C.45 ml / h

D.15 ml / h

E.50 ml / h

15. After what time at a temperature of air 0 ~ C cooling will be fatal?

A. 4-6 hours
B. 6-8 hours
C. 10-12 hours
D. 1-2 hours
E. 24 hours

16. The victim of overcooling is inhibited, the criticism of assessment of his state is reduced, the speech is chanted, his movements are constraint, the ability to independent movement is preserved, the blood pressure is elevated, respiration is satisfactory. Indicate the clinical stage of overcooling:

A. I (dynamic)
B. II (stuporous)
C. III (convulsive)
D. All of the above
E. None of the above

17. The victim of overcooling is sharply restrained, in a pose of a "twisted man", movements are impossible. The skin covers are bluish, with marble vine, heart rate up to 40 in 1 min. Breathing is fluid, superficial. Indicate the clinical stage of overcooling:

A. I (addynamic)
B. II (stuporous)
C. III (convulsive)
D. All of the above
E. None of the above

18. Patient without consciousness, pupils are narrowed, the reaction to the light is weakened or retarded, convulsions, trichism of chewing muscles, no blood pressure, respiration of fluid, periodic rhythm of Chain-Stokes. Indicate the clinical stage of overcooling:

A. I (addynamic)

B. II (stuporous)

C. III (convulsive)

D. All of the above

E. None of the above

19. Your measures in providing assistance to the victim with general overcooling:

A. 40% ethanol inside

B. intravenous Bemegrid, Cordiamine

C. Prednisolone 60-90 mg

D. intravenous infusion of the solutions heated up to 36-37 C

20. Indicate unacceptable measures of the pre-hospital stage when providing assistance to a victim with overheating:

A. physical cooling

B. Aminazine or droperidol

C. Intravenous infusion of cooled crystalloids

D. Sulfoxamaphocain

1	2	3	4	5	6	7	8	9	10
B	**A**	**B**	**C**	**A**	**A**	**B**	**C**	**E**	**B**
11	12	13	14	15	16	17	18	19	20
C	**A**	**A**	**A**	**C**	**A**	**B**	**C**	**D**	**D**

RECOMMENDED LITERATURE

Basic

1. Mykhailovska N.S. Care of Patients With HIV Infection in the practice of family doctor: study guide for the practical classes and individual work for 6th-years students of international faculty (speciality «Medicine», «Pediatrics») Discipline «General practice – family medicine» / N. S. Mykhailovska, A. V. Grytsay (approved by the Central Methodical Council of Zaporizhzhia State Medical University (prot. № 3 dated 22.02. 2022). – Zaporizhzhia : ZSMU, 2022. – 130p.

2. Mykhailovska N.S. The rehabilitation of out-patients in the practice of family doctor: study guide for the practical classes and individual work for 6th-years students of international faculty (speciality «Medicine», «Pediatrics») Discipline «General practice – family medicine» / N. S. Mykhailovska, A. V. Grytsay (approved by the Central Methodical Council of Zaporizhzhia State Medical University (prot. № 3 dated 22.02. 2022). – Zaporizhzhia : ZSMU, 2022. – 155p.

3. Mykhailovska N.S. Prevention of the most common diseases in the practice of family doctor: study guide for the practical classes and individual work for 6th-years students of international faculty (speciality «Medicine», «Pediatrics») Discipline «General practice – family medicine» / N. S. Mykhailovska, A. V. Grytsay, I.O. Stetsyuk, M.O. Konovalova (approved by the Central Methodical Council of Zaporizhzhia State Medical University (prot. № 5 dated 27.05. 2021). – Zaporizhzhia : ZSMU, 2021. – 242p.

4. Mykhailovska N.S., Gritsay G.V., Kachan I.S. Tactics of family doctors in case of syncopal states: study guide for the practical classes and individual work for 6th-years students of international faculty (speciality «General medicine») Discipline «General practice – family medicine», approved by the Central Methodical Council of Zaporizhzhia State Medical University (prot.№ 3 dated 27.02. 2020). – Zaporizhzhia : ZSMU, 2020. –166 p.

5. Mykhailovska N.S., Gritsay G.V., Stetsyuk I.O., Kachan I.S. Pain syndrome in general medical practice: study guide for the practical classes and individual work for 6th-years students of international faculty (speciality «General medicine») Discipline «General practice – family medicine», approved by the Central Methodical Council of Zaporizhzhia State Medical University (prot. № 3 dated 27.02. 2020). – Zaporizhzhia : ZSMU, 2020. –138 p.

6. Mykhailovska N.S., Gritsay G.V., Kulinich T.O. The principles of the primary health care organization in Ukraine: the practical workbook for the 6th-year students of international faculty, the academic discipline: «General practice – family medicine» approved by the Central Methodical Council of Zaporizhzhia State Medical University (prot. № 1 dated 01.10. 2020). – Zaporizhzhia: ZSMU, 2020. – 90 p.

7. Mykhailovska N.S., Gritsay G.V., Miniailenko L.E. Organizational aspects of primary health care system in Ukraine: study guide for the practical classes and individual work for 6th-years students of international faculty (speciality «General medicine») Discipline «General practice – family medicine», approved by the Scientific Council of Zaporizhzhia State Medical University (prot.№ 8 dated 20.03 2018). – Zaporizhzhia : ZSMU, 2018. –175 p.

8. Mykhailovska N.S., Gritsay G.V. Miniailenko L.E., Stetsyuk I.O. The risk factors and screening of main chronic noncommunicable diseases: study guide for the practical classes and individual work for 6th-years students of international faculty (speciality «General medicine») Discipline «General practice – family medicine», approved by the Central Methodical Council of Zaporizhzhia State Medical University (prot.№ 5 dated 24.05 2018). – Zaporizhzhia : ZSMU, 2018. – 158 p.

9. Mykhailovska N.S., Gritsay G.V., Miniailenko L.E., Stetsyuk I.O. The first aid in the case of non-epidemic diseases: study guide for the practical classes and individual work for 6th-years students of international faculty (speciality «General medicine») Discipline «General practice – family medicine», approved by the

Central Methodical Council of Zaporizhzhia State Medical University (prot.№ 5 dated 24.05 2018). – Zaporizhzhia : ZSMU, 2018. –105 p.

10. Mykhailovska N.S., Gritsay G.V., Miniailenko L.E., Oliynik T.V., Stetsyuk I.O. Primary role of family medicine in the public health system: compilation of tests for final knowledge control for the practical classes and individual work for 6th-years students of international faculty (speciality «General medicine») Discipline «General practice – family medicine», approved by the Central Methodical Council of Zaporizhzhia State Medical University (prot.№ 5 dated 24.05 2018). – Zaporizhzhia : ZSMU, 2018. – 194 p.

11. Family Medicine: in 3 books: textbook. Book 2. Symptoms fnd syndromes in clinical course of internal diseases / O.M. Hyrina, L.M. Pasiyeshvili, O.M. Barna, A.S. Svintsitskyi et al.; edited by O.M. Hyrina, L.M. Pasiyeshvili. – Kyiv: AUS Medicine Publishing, 2018. – 376 p.

12. Family Medicine : in 3 books : textbook. Book 1. General Issues of Family Medicine / O.M. Hyrina, L.M. Pasiyeshvili, O.M. Barna, A.S. Svintsitskyi et al. ; edited by O.M. Hyrina, L.M. Pasiyeshvili. – Kyiv : AUS Medicine Publishing, 2018. – 560 p.

Additional

13. Mykhailovska N.S., Gritsay G.V. The basis of prevention in the practice of general practitioners: The textbook for the practical classes and individual work for 6th-years students of international faculty (speciality «General medicine») discipline «General practice – family medicine, approved by the Scientific Council of Zaporizhzhia State Medical University (prot.№ 12 dated 30.05 2017). – Zaporizhzhia : ZSMU, 2017. – 224p.

14. Mykhailovska N.S., Gritsay G.V. E-teaching complex «The basis of family medicine» for 6th-years students of international faculty (speciality 222 «Medicine») Discipline: «General practice – family medicine», approved by the Scientific Council of Zaporizhzhia State Medical University (prot. № 3 dated 02.02. 2017). – Zaporizhzhia : ZSMU, 2017.

15. Mykhailovska N.S., Gritsay G.V. The practical workbook. Discipline «General practice – family medicine» for 6-th year students of international faculty. Content module 1,2, approved by the Scientific Council of Zaporizhzhia State Medical University (prot.№ 4 dated 23.02. 2017). – Zaporizhzhia : ZSMU, 2017. – 69p.

16. Mykhailovska N.S., Gritsay G.V. The practical workbook. Discipline «General practice – family medicine» for 6-th year students of international faculty. Content module 3, approved by the Scientific Council of Zaporizhzhia State Medical University (prot.№ 4 dated 23.02. 2017). – Zaporizhzhia : ZSMU, 2017. – 75p.

17. Mykhailovska N.S., Gritsay G.V. The basis of prophylaxis of widespread diseases in the practice of family doctor: The teaching textbook for the practical classes and individual work for 6th-years students of international faculty (speciality «General medicine»), approved by Central Methodical Council of Zaporizhzhia State Medical University (prot. № 4 protocol № 4, dated 02.06.2016). – Zaporizhzhia : ZSMU, 2016. –187 p.