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Master's Thesis

THE MANAGEMENT OF PAIN SYNDROME AND THE PRINCIPLES OF ANESTHETIC MANAGEMENT IN PERIOPERATIVE PERIOD

Master of Science in Nursing

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ABSTRACT

The study of such subjective symptom as pain does not have an unambiguous interpretation by different people. When defining the criteria for a good surgical outcome, most surgeons agree that pain relief is the main parameter that determines an outcome as "good". However, it is difficult to assess which improvement on an visual analog scale corresponds to a clinically meaningful improvement. Positive changes in performance status, activities of daily living and returning to work are the second most frequently mentioned criteria for a positive outcome.

Therefore, the purpose of this project is studying and assessment of pain syndrome as one of the main criteria in surgical studies.

This study consisted of patient observation and data analysis. In the first part of the research work, we have conducted a study and analysis of the number of patients with various diseases who have had surgical interventions and determined the intensity of pain syndrome on the second day after the operation. In this part of the research work, 87 patients were enrolled. In the second part of the research work, we have conducted a comparison of the intensity of pain syndrome in patients of various surgical profiles. As a next step, we have conducted data analysis, comparisons and data summarization with inferencing.

A large number of scheduled surgeries allow predicting the likelihood of expected moderate to severe pain in patients who have experienced a pain of such intensity in our study. However, not enough preventive measures have been taken to avoid the onset of pain.

As a result of the research, the authors analyzed specific aspects of pain syndrome and the principles of its management in nursing practice; the main methods and principles of pain control in the patients; determined the principles for preparation of patients with pain syndrome to surgical procedures; studied the characteristic features of anesthetic management of surgical patients with various disease; investigated the potential anesthesia-related complications after the surgery; conducted comparison and analysis of pain intensity in the

postoperative period of patients with various orthopedic, cardiosurgical, general surgical and gynecological diseases.

It should be pointed out that the follow-up of pain is a very important aspect of anesthesiological nursing practice, since it may greatly relieve the suffering of the patients, and improve their quality of care and quality of life during their hospital stay.

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INTRODUCTION

The relevance of the study. Pain, which signals danger, is one of the leading reasons for seeking specialized care; it is pain that substantially reduces the quality of life in a wide range of medical and surgical conditions [1, 4]. Fortunately, modern medicine is evolving very fast. New drugs and surgeries are saving the lives of many people. Approximately 230 million surgeries are performed each year, many of which are accompanied by pain in the pre- and postoperative period and require adequate anesthesia during the operation [2, 9]. Nearly 1.5 billion people on Earth suffer from chronic pain. Approximately half of patients with chronic pain change their doctor at least twice in six months, which is a clear sign of dissatisfaction with the quality of care [7, 14]. The relevance of the problem is so high that there is a clear trend to separate pain medicine into an independent area of clinical practice, which requires physicians of different specialties to know the mechanisms of pain development, interpretations, methods of pain management and practical skills of clinical and instrumental examination [8, 20].

Postoperative pain of various intensity occurs after any surgical procedure, both after minimal outpatient interventions and after highly traumatic operations that may last for many hours [13, 26].

Postoperative pain is a painful sensation that occurs in a surgical patient in surgical site. The World Health Organization and International Association of Study of Pain (IASP) have acknowledged pain control as an inalienable human right [3, 10, 32]. Every patient is entitled to relief of pain associated with disease and/or medical intervention, using available methods and drugs [11, 17].

In modern medicine, anesthesia does not simply mean management of vital signs during a surgical intervention [24]. Using anesthesia, physicians seek to eliminate possible risk factors throughout the surgical process, minimize pain, as well as complications after general anesthesia, such as nausea and vomiting,

facilitate recovery and early return of patients to daily life, which determines the overall relevance of this research study [19, 27].

The aim of the study was to investigate the specific aspects of nursing process in anesthesiology practice, the specific aspects and types of analgesia in patients with pain syndrome; in part, during and after the surgery, to determine the quality of life impact of pain syndrome and the methods of its management, to study the specific aspects of preoperative period and the role of nursing personnel in this period, to study the anesthetic management of patients with surgical diseases and assess pain intensity in the postoperative period, and to study potential anesthetic complications after the operation.

Study objectives.

1. To investigate the specific aspects of pain syndrome and the principles of its management in nursing practice.
2. To investigate the main methods and principles of pain control in the patients.
3. To determine the principles for preparation of patients with pain syndrome to surgical procedures.
4. To study the characteristic features of anesthetic management of surgical patients with various disease.
5. To study the potential anesthesia-related complications after the surgery.
6. To compare pain intensity in the postoperative period of patients with various orthopedic, cardiosurgical, general surgical and gynecological diseases.

The object of research. Orthopedic, cardiosurgical, general surgical and gynecological patients with various disease, where pain intensity was assessed in the postoperative period.

The subject of research. Nursing process in anesthesiological practice, intensity of pain syndrome in patients with various disease in the postoperative period.

The methods of study included the following: general clinical assessments, general surgical and anesthesiological methods of patient assessment, including history of present disease and health history, patient observation, objective examination, general health assessment, data comparison, laboratory, instrumental and imaging tests; analytic method; statistical research methods.

The scientific and practical value of the study. In course of evaluation of anesthesiological patients, we identified the main methods of providing care to patients with various diseases; we have studied the incidence of pain syndrome and the possible algorithms of providing care to patients with this condition; in the study, we have defined the main rules of care for patients selected for surgical interventions; we have studied the specific aspects of providing care to patients in orthopedic, cardiological, general surgical and gynecological practice; the research study has compared the data obtained for the intensity of postoperative pain in patients of various profiles; we have studied potential anesthesia-related complications and the possible methods of their prevention and treatment.

CHAPTER 1
PAIN SYNDROME AND THE PRINCIPLES OF ITS MANAGEMENT IN NURSING PRACTICE
(REVIEW OF LITERATURE)

In their life, virtually every person has experienced pain as an unpleasant sensation with negative emotional experiences [5]. Often enough, pain performs a signaling function, warning the body of danger and protecting it from possible excessive damage. Such pain is referred to as physiological pain. Perception, conducting and analyzing pain signals in the body are maintained by special neuronal structures of the nociceptive system that are part of the somatosensory analyzer. Therefore, pain can be seen as one of the sensory modalities required for normal bodily functions, which warns the body of aggressive influences [4, 16].

There is also another variety of pain, which has abnormal significance for the body; it causes disability, reduces activity levels, triggers psycho-emotional disorders and causes regional and systemic microcirculatory disorders; it may also be the cause of secondary immunosuppression and disrupted activity of visceral systems. Such pain is referred to as abnormal pain [7]. In a biological sense, it is dangerous for the body, causing a whole range of maladaptive responses.

Pain is always subjective; its final assessment is determined by the site and the nature of the disturbance, the nature of the damaging factor, the psychological status of the individual and their personal life experience. Pain is one of the most common complaints that make the patient seek medical attention; almost always, pain suggests an abnormal process [15].

Whatever therapeutic regimen may be, it must include both the treatment of underlying condition and the management of pain. Usually, patients are admitted to a hospital as referred by general practitioners or by specialist physicians who have made the diagnosis, and often after treatment of their underlying condition

has been already initiated. Patients with chronic pain of unknown origin are hospitalized without an established diagnosis; however, in this case, severe and life-threatening disease should be ruled out before the treatment begins [2, 21].

Presently, pain is a serious clinical problem requiring much effort on the part of physicians to improve the quality and the efficacy of pain management. According to the statistical data of health services and leading pain management experts, approximately 20 million people suffer from chronic pain syndrome (more often a result of poorly managed acute pain) in the US alone. Not surprisingly, analgesics ("pain killers") are one of the most sought-after category of drugs [27].

As mentioned before, chronic pain is a serious clinical problem. Worldwide, one in five adults is estimated to suffer from pain, and one in ten is annually diagnosed with chronic pain. Up to 10% of global population, i.e. more than 600 million people suffer from chronic pain, and fairly reliable analytical reviews of the problem in selected countries and regions suggest the prevalence of chronic pain to approximate 20-25% [33].

The prevalence and the enormous social and medical consequences of chronic pain require that the medical community pay due attention to this issue.

Pain syndrome occurs in different demographics around the globe, regardless of age, sex, income level, ethnicity, or geographic location. Pain can be acute, chronic, intermittent, or a combination of all three. [3, 21]. The main causes of pain include such conditions as malignant tumors, diseases of the skeletal system, rheumatoid arthritis, surgical procedures and injuries, as well as spinal problems, making the etiology of pain a complex interdisciplinary problem. Pain is accompanied by multiple serious consequences, including hypodynamia and depression, leads to disability, impaired social relations and suicidal thoughts [28].

Pain syndrome is a complex phenomenon, where the actual sensation referred to as pain, is considered but one of the components. Pain consists of four concepts: nociception (the effect of local damage or injury on nerve endings

or nociceptors); sensation of pain, which is a psychological phenomenon; suffering as a result of pain, which is usually manifested as anxiety in case of acute pain and as depression in case of chronic pain; and pain behavior (facial expression, being restless, wanting to be alone or, conversely, among other people, taking medicines, etc.). At its core, pain is an acquired response of the body [7, 15].

Pain is a physiological phenomenon that informs about damaging effects or about the factors potentially threatening the body. Thus, pain is both a warning system and a defense system [2]. Currently, the most popular definition of pain is the definition given by International Association for the Study of Pain (IASP, Merskey, Bogduk, 1994): “An unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage” [9]. This definition does not evaluate the nature and the origin of the pain stimulus, but points out a conscious interpretation of painful sensations. This definition suggests that sensation of pain may occur not only in tissue damage or when at risk for tissue damage, but even in the absence of any damage. In the latter case, the decisive factor in the mechanism of pain occurrence is the psychoemotional status of a person, i.e. the presence of depression, hysteria or psychosis [12]. In other words, the individual’s interpretation of painful sensation, and their emotional reaction and behavior may not correlate with the severity of damage.

Clinical classification of pain.

Five principal components may be identified in the overall structure of pain:

• perceptive: it allows identifying the site of damage;

• emotional-affective: it reflects a psycho-emotional response to an injury;

• vegetative: it is associated with a reflex-driven change in the tone of the sympathoadrenal system;

• motor: it is aimed at eliminating the effects of damaging stimuli;

• cognitive: it participates in shaping a subjective attitude to the currently experienced pain based on accumulated experience.

According to time-dependent parameters, acute and chronic pain types are distinguished.

Acute pain is a new recent pain, which is inextricably linked to the damage that caused it; as a rule, such pain is a symptom of a disease. Acute pain occurs as a result of nociceptive impact, which may be due to injury, disease, as well as dysfunction of muscles or internal organs. This type of pain is usually accompanied by a neuroendocrine stress, the severity of which is proportional to the intensity of exposure. The “purpose” of acute pain is to detect, localize and delimit tissue damage, which is why it is also referred to as nociceptive pain. [14]. The most common types of acute pain include post-traumatic pain, postoperative pain, labor pain, as well as the pain secondary to acute diseases of internal organs (e.g. myocardial infarction, pancreatitis, urolithiasis, etc.). In most cases, acute pain resolves spontaneously or as a result of treatment, within hours to days [16, 21].

In cases where pain persists due to impaired regeneration or inadequate treatment, it becomes chronic. Chronic pain is characterized by persistence after the resolution of the acute phase of the disease or after a time sufficient for healing. In most cases, the duration of this period ranges from 1 to 6 months. The causes of chronic pain may include peripheral nociceptive exposure, as well as the dysfunction of peripheral or central nervous system (CNS). Chronic pain often acquires the status of a long-lasting independent disease, and in some cases the cause for this pain is unknown. It is typical that psychological mechanisms or external factors are often the main cause of chronic pain; neuroendocrine response to stress is weakened or absent, and sleep disorders and affective disorders are quite pronounced [16]. Chronic pain is one of the most costly current health care problems in industrialized countries. Estimated prevalence of chronic pain in these countries is 25-30%; almost $90 billion is spent annually on pain management in the United States [28].

Depending on the pathogenesis, pain syndromes are divided into somatogenic (nocigenic), neurogenic and psychogenic. The pain syndromes that arise from the activation of nociceptive receptors in injuries, inflammation, ischemia and tissue stretching are classified as somatogenic pain syndromes. In clinical terms, the following types of pain syndrome are distinguished: post-traumatic, postoperative, myofascial pain syndrome, pain in joint inflammation, pain in cancer patients, pain in involvement of internal organs (visceral pain syndrome) and many others [1, 9].

When the impulses occurring in irritation of nociceptors in the skin, in deep tissues or in the viscera, follow the classic anatomical pathways, reach the higher divisions of the nervous system and are reflected in the consciousness, a sensation of pain is formed. The pain emanating from internal organs is triggered by a rapid contraction, spasm or stretching of smooth muscles, since these organs are essentially insensitive to heat, cold or dissection. The pain from internal organs, especially those having sympathetic innervation, can be felt in certain areas on the surface of the body. Such pain is referred to as reflected (irradiated) pain. The most widely known examples of irradiated pain include pain in the right shoulder and right side of the neck in gallbladder problems, pain in the lower back due to urinary bladder problems, and, finally, pain in the left arm and left side of the chest in heart disease [6, 18]. The neuroanatomical rationale for this phenomenon is not fully understood. A possible explanation is that the segmental innervation of the internal organs is the same as that of distant regions on the body surface. However, this does not explain the causes of reflecting pain from an organ to the body surface [19].

Neurogenic type of pain is defined as pain resulting from damage to peripheral nervous system or central nervous system; however, this type of pain is not attributable to irritation of nociceptors. Such pain has a number of differences that distinguish it from nocigenic pain both clinically and pathophysiologically (Bowsher, 1988). Neurogenic pain is of a dysesthesia character [8].

Neurogenic pain has the following typical characteristics:

1. In most cases of neurogenic pain, there is a partial loss of sensitivity.

2. Typical manifestations include disorders of the autonomous nervous system, such as reduced blood flow and hyper-/hypohydrosis in the pain area. Pain often enhances or triggers emotional disorders and stress.

3. A usual finding includes allodynia (a painful sensation in response to low-intensity triggers that normally do not cause pain). For example, in patients with trigeminal neuralgia, a light touch, a breath of air or low-intensity tactile stimulation such as combing may cause a “pain volley” in response (Kugelberg, Lindblom, 1959). More than a hundred years ago, Trousseau (1877) noticed the similarity between the paroxysmal shooting pain in trigeminal neuralgia and epileptic seizures. It is currently known that shooting neurogenic pain is often well-controlled with anticonvulsants (Swerdlow, 1984) [27].

4. An inexplicable characteristic feature of abrupt neurogenic pain is that it does not prevent the patient from falling asleep. However, even if the patient does fall asleep, they may wake up suddenly to strong pain.

5. Neurogenic pain is intractable to morphine and other opiates in usual analgesic doses. This demonstrates that the mechanism of neurogenic pain is different from that of opioid-sensitive nocigenic pain.

Neurogenic pain has multiple clinical forms. These include some lesions of peripheral nervous system, such as post-herpetic neuralgia, diabetic neuropathy, incomplete peripheral nerve damage, especially the median nerve and ulnar nerve (post-traumatic osteoporosis), detachment of brachial plexus branches, etc. The development of neurogenic pain syndromes is attributable to damaging the peripheral or central nervous system structures that participate in conduction of nociceptive signals. Examples of such pain syndromes include neuralgias (trigeminal, intercostal, etc.), phantom pain syndrome, thalamic pain and causalgia [22, 24].

Neurogenic pain due to CNS involvement is usually due to a cerebrovascular accident; it is known by the classical name of "thalamic

syndrome". However, recent studies demonstrate that in most cases the focal lesions are located in areas other than the thalamus (Bowsher et al., 1984) [31].

Many types of pain are clinically manifested by mixed (i.e. nocigenic and neurogenic) elements. For example, tumors cause tissue damage and nerve compression; in patients with diabetes, nocigenic pain develops due to peripheral vessel damage, neurogenic pain occurs due to neuropathy; in intervertebral hernias that compress nerve root, the pain syndrome includes a burning and shooting neurogenic element [2, 3].

Any chronic disease or malaise, which is accompanied by pain, affects the emotions and behavior of the individual. Pain often leads to anxiety and mental tension, which enhance pain perception. This explains the importance of psychotherapy in pain control. Biofeedback, relaxation training, behavioral therapy and hypnosis are used as psychological interventions; they may be useful in certain recalcitrant and treatment-refractory cases (Bonica, 1990; Wall, Melzack, 1994; Hart, Alden, 1994). The treatment may be more effective if it takes into consideration the mental sphere, the psychophysiology, and the cognitive and behavioral responses, which potentially affect pain perception (Cameron, 1982). The leading role in the mechanism behind the development of psychogenic pain syndromes belongs to psychological factors, which initiate pain in the absence of any serious somatic disorders [25]. Pain of a psychological nature is often triggered by overstrain of certain muscles, which is in turn provoked by emotional conflicts or psychosocial problems. Psychogenic pain may be a component of a hysterical reaction or occur as a delusion or hallucination in schizophrenia; as such, it may disappear with adequate treatment of the underlying disease. Psychogenic pain may include depression-associated pain, which does not precede depression and does not have an alternative explanation [30].

Different therapeutic approaches are used in acute and chronic pain. While the management of acute pain may be initiated effectively immediately, the treatment of chronic pain often calls for additional assessments. As an example,

a patient with postoperative pain requires much less assessment than a patient with a 10-year history of chronic back pain, for which they visited multiple doctors and had various treatments. While in the first case, a regular history collection and a standard assessment (including quantification of pain intensity) are sufficient, the second case calls for a meticulous collection of history and physical examination, psychological and social assessment, and a review of accompanying medical records [17, 26].

During the assessment, special attention should be paid to the musculoskeletal system and the nervous system. Patients with chronic pain often require the use of imaging tests, which may include X-ray imaging, computed tomography (CT), magnetic resonance imaging (MRI) and bone scan. These tests allow detecting previously unnoticed injuries, tumors and metabolic bone disease. MRI is a highly sensitive method of soft tissue imaging; in part, it has the ability to detect nerve compression [19].

Electromyography and neuromuscular conductivity studies allow differentiating mononeuropathy (due to trauma, compression or strangulation) from polyneuropathies, which include the diseases characterized by either widespread symmetrical lesions, or by randomly distributed lesions (i.e. multiple mononeuropathy). Polyneuropathy may be attributable to loss of axons, demyelination and to a combination of these two factors. In demyelination, the conduction of an impulse along the nerve slows down, the amplitude decreases and the latency of action potential increases. When axons are damaged, the opposite is true: reduced amplitude of action potential is combined with an intact conduction velocity. Intoxications, congenital disorders, injuries and ischemia contribute to axonal loss, while some congenital disease and the majority of autoimmune disorders lead to demyelination. Diabetic neuropathy is often due to a combination of axonal loss and demyelination [29].

The diagnosis of early post-traumatic osteoporosis uses thermography. Myofascial syndromes and ligament lesions are often manifested by multiple sites of increased heat radiation, which correspond to trigger points and areas of

muscle spasm. In diseases of bones and joints, increased heat radiation is observed over the areas with increased blood flow, while peripheral vascular disease is accompanied by a reduced heat radiation over the affected extremity [23].

Diagnostic/therapeutic nerve block with local anesthetics is intended for management of acute and chronic pain; in some cases, it is used for identification of the mechanisms that trigger the pain. Nerve block allows to determine the degree of involvement of the sympathetic nervous system in the genesis of pain. The analgesic effect of the block may last significantly longer than the known duration of action of anesthetics, i.e. for many hours, sometimes even weeks [12, 22].

Pharmacotherapy of pain syndrome.

The best way to improve acute pain is to eliminate its cause. Analgesics may only be administered when the cause cannot be eliminated. It is well-known that analgesics reduce the response to pain, but do not eliminate the cause. However, pain relief does not necessarily depend on the use of analgesics. Cold water can relieve pain when applied to the burn site; an alkaline mixture may relieve pain due to peptic ulcer, and gentle local heat or massage relieves muscle pain. Recent clinical studies suggest that acupuncture or percutaneous electrical nerve stimulation may alleviate certain types of pain. A study by Henry K. Beecher [23] has found that 35% of people with various painful conditions experienced relief after they were given placebo.

Medications used to relieve pain include cyclooxygenase (COX) inhibitors, opioids, antidepressants, antipsychotics, corticosteroids, and anticonvulsants. The systemic use of local anesthetics should also be noted. Particular attention is paid to COX inhibitors, since this is the most popular group of drugs for the treatment of pain. As a rule, opioids are used for the treatment of moderate to severe acute pain, as well as the pain caused by malignant tumors. [7, 11].

Antidepressants. When used for analgesia, the doses of these drugs are lower than the doses that cause antidepressant effect. Both of the aforementioned

effects are due to the block of presynaptic uptake of serotonin, norepinephrine, or both neurotransmitters. Drugs that effectively block serotonin reuptake, possess the most pronounced analgesic activity. Antidepressants are mainly indicated for neuropathic pain, such as in post-herpetic neuralgia and diabetic neuropathy. They potentiate the effect of opioids and improve sleep [18, 26].

Antidepressants differ in their side effects due to the following mechanisms: block of M-cholinergic receptors causes dry mouth (xerostomia), disorders of accommodation, urinary retention and constipation; histamine receptor (H_1 and H_2) block causes sedation and increased pH in the stomach; the block of α-adrenergic receptors is manifested by orthostatic hypotension; quinidine-like effect may also be manifest (especially for amitriptyline).

Antipsychotics. Some physicians believe that antipsychotic drugs allow eliminating refractory neuropathic pain; they are especially effective in severe agitation and psychosis. The most commonly used antipsychotics include haloperidol and chlorpromazine. The mechanism of their action is due to the block of dopaminergic receptors in the mesolimbic region. Unfortunately, the block of dopaminergic receptors in the nigrostriatal system causes extrapyramidal disorders, which are manifested as mask-like facial expressions, festinating gait, cogwheel rigidity and bradykinesia. Some patients develop acute dystonic reactions in the form of torticollis. The slowly developing adverse effects include restlessness and tardive dyskinesia (involuntary choreoathetoid movements of the tongue, sucking motions and dystonic body movements). Similar to antidepressants, the majority of antipsychotic drugs have antihistamine, anticholinergic (block of M-cholinergic receptors) and antiadrenergic (block of α-adrenergic receptors) effects [25, 31].

Anticonvulsants. These drugs are indicated for neuropathic pain, especially trigeminal neuralgia, as they are able to suppress spontaneous neuronal firing, which plays a major role in the genesis of neuropathic disorders. The most frequently used agents include phenytoin, carbamazepine and clonazepam. All of these drugs have a high degree of protein binding and a relatively prolonged

half-life. Carbamazepine has a slow and unpredictable absorption, which requires monitoring of its serum levels [33].

Corticosteroids. These drugs are widely used in pain management, since they possess anti-inflammatory and, possibly, analgesic effects. The routes of administration are local, oral or parenteral (intravenous, subcutaneous, intrabursal, intra-articular, epidural). These drugs differ by the magnitude of their main effect, the relative glucocorticoid and mineralocorticoid activity, as well as the duration of action. Increasing the dose and prolonging the course of treatment aggravates the severity of adverse effects. Excessive glucocorticoid activity is manifested by hypertension, hyperglycemia, increased susceptibility to infections, peptic ulcers, osteoporosis, aseptic necrosis of the head of the femur, proximal myopathy, cataract, and (rarely) psychosis. The patient may acquire the appearance characteristic of Cushing syndrome. [14, 29]. Excessive mineralocorticoid activity is manifested by sodium retention and hypokalemia, and also triggers the development of heart failure.

Systemic use of local anesthetics. In neuropathic pain, local anesthetics are sometimes administered intravenously to induce sedation and central analgesia. Time-wise, the analgesic effect often exceeds the pharmacokinetic profile of the local anesthetic and interrupts the pain cycle. The most frequently used local anesthetics include lidocaine, procaine and chloroprocaine [6].

Cyclooxygenase inhibitors. COX inhibitors with an option for oral use include salicylates, acetaminophen, non-steroidal anti-inflammatory drugs (NSAIDs), and selective COX-2 inhibitors. By inhibiting COX, these drugs inhibit the synthesis of prostaglandins, which cause analgesic, antipyretic and anti-inflammatory effects. COX inhibitors are very effective in eliminating certain types of pain, especially after orthopedic and gynecological interventions, which suggests the important role of prostaglandins in their genesis, and also have an important effect on the peripheral nervous system and central nervous system. Their analgesic effect is somewhat limited by adverse effects and toxicity when used in high doses [14, 17].

COX inhibitors are well absorbed in the gastrointestinal tract. After meals, absorption slows down, but this does not affect the bioavailability of drugs. By binding with plasma proteins to a substantial degree (>80%), they may be displaced from this bond by other drugs with similar properties. All these drugs are metabolized in the liver and excreted by the kidneys; therefore, their doses in liver and kidney disease should be reduced.

The most frequent adverse effects of acetylsalicylic acid and other NSAIDs include dyspepsia (i.e. heartburn, nausea, upper abdominal discomfort etc.). Some patients may develop ulcers of gastric mucous lining, which is due to inhibition of prostaglandin-dependent mechanism of secretion of gastric mucus and bicarbonate. Other adverse effects include dizziness, headache and drowsiness. With the exception of acetaminophen, all COX inhibitors cause impaired platelet aggregation. Aspirin acetylates platelets irreversibly, inhibiting their adhesion and aggregation for 1-2 weeks, since the anti-platelet effect of NSAIDs is reversible and corresponds to approximately five elimination half-lives (i.e. 24-96 hours). At the same time, this adverse effect does not significantly increase the risk of postoperative bleeding after the vast majority of outpatient procedures [27]. Aspirin and other NSAIDs may trigger bronchospasm in a patient where nasal polyps are combined with rhinitis and asthma (the so-called triad). It is not recommended to use aspirin in children younger than 12 years of age, since it has been linked with Reye's syndrome, a serious and often lethal disease in children with viral infections. Back in 1982 the US Surgeon General warned against the use of aspirin and other salicylates in children with chicken pox or flu. Finally, NSAIDs may trigger the development of acute renal failure and papillary renal necrosis, especially in concomitant renal dysfunction [11, 30].

Cyclooxygenase is playing a key role in the synthesis of prostaglandins. Two isoforms of the enzyme have been studied, COX-1 and COX-2. The main enzyme (COX-1) is produced in virtually all tissues, while the production of COX-2 is virtually impossible without induction by inflammatory stimuli. It is

believed that mainly COX-2 is responsible for the synthesis of prostanoid mediators of pain, inflammation and fever. It is also believed that COX-2 is involved in the processes of ovulation, implantation and closure of ductus arteriosus, as well as in the functions of the central nervous system, in particular in the development of fever, pain sensitivity and cognitive functions [23, 27].

Specific COX-2 inhibitors do not affect COX-1, but only have anti-inflammatory and analgesic effects. The effect of these drugs is not only targeted, but also quite powerful. Their main advantage is the absence of class-specific side effects inherent in non-selective NSAIDs in the form of adverse effects on blood clotting and on the gastrointestinal tract. The low risk of complications leads to a reduction in the costs for their prevention, treatment, and other hospital costs associated with repeated hospitalizations, intensive care, blood transfusions, and other factors [19].

Systemic reviews on the use of specific COX-2 inhibitors support the above. Thus, the preoperative use of coxibs showed clear benefits in terms of pain reduction, analgesic consumption and improved patient well-being compared with placebo (Straube et al., 2005).

Specific COX-2 inhibitors may act in the central (that is, they easily penetrate the blood-brain barrier) and in the peripheral parts of the nervous system. Ultimately, stimulus-induced COX-2 induction probably persists until peripheral inflammation subsides. Thus, selective inhibition of COX-2 plays an integral role in the treatment of pain [6].

Opioids. In moderate to severe postoperative pain, oral opioids are indicated (as required or at regular intervals). Opioids are often combined with COX inhibitors, which enhances the overall analgesic effect and reduces the severity of side effects. All opioids undergo biological transformation and conjugation in the liver, after which they are eliminated by the kidneys [22, 24]. The side effects of opioids are identical regardless of the route of administration; when opioids are given at regular intervals, it is advisable to use laxatives. The disadvantages of opiate analgesia:

• respiratory depression, which is critical for spontaneously breathing patients or for patients on respiratory support;

• hypotension, usually developing against the backdrop of hypovolemia;

• congestion in the stomach, which is aggravated by the use of opiates in critically ill patients;

• high abuse potential;

• lack of autonomic nervous system-stabilizing effect in pain syndromes;

• opiates do not improve endocrine disorders.

Complementary pain therapies.

Psychotherapy. The available techniques include, among others, cognitive psychotherapy, behavioral psychotherapy, biofeedback and mental relaxation techniques, as well as hypnosis. The basis of cognitive psychotherapy is that the patient's attitude towards pain may shape pain perceptions. Inadequate attitude contributes to more suffering and disability. Patients master the skills of coping with pain during individual or group psychotherapy. The most frequently used methods include distraction techniques and guided imagery [10, 27].

Hydrotherapy, thermotherapy and electric therapy. By eliminating muscle spasm, heat and cold treatments may provide an analgesic effect. In addition to that, heat is reduces joint stiffness and increases blood flow in the joints, while cold causes vasoconstriction and helps reduce tissue edema. The analgesic effect of heat and cold can be explained, at least in part, within the framework of gateway theory of nociceptive impulse conduction.

Surface warming is achieved through contact techniques (hot moist wraps, paraffin baths), convection (hydrotherapy) and radiation techniques (infrared irradiation). The methods with deep thermal effect include ultrasound therapy, as well as shortwave and microwave diathermy; these methods are especially effective in eliminating pain emanating from deep-seated joints and muscles. Cold is indicated in pain associated with acute injuries and edema [13]. In some cases, cold can eliminate muscle spasm. Cooling techniques include cold wraps, ice cube massage and the use of cooling sprays (ethyl chloride, fluoromethane).

Any program of rehabilitation of patients with chronic pain should include physical exercise. A step-wise challenge exercise program allows preventing joint stiffness, muscle atrophy and contractures, i.e. the conditions that trigger pain and cause dysfunction [20].

Acupuncture. This is a supplementary treatment method in chronic pain; reportedly, it is particularly effective in patients with chronic musculoskeletal disease and headache. Acupuncture includes insertion of needles into certain points on the body surface, which are located along traditional conventional lines known as meridians. The stimulation includes rotating the needle or applying a weak electric current the needle. Of note, acupuncture points do not coincide with the generally accepted anatomical landmarks of the nervous system. Although conclusive formal evidence regarding the mechanism of action of acupuncture and its role in pain management is lacking, some data suggests that acupuncture stimulation triggers the release of endogenous opiates, since its effects are negated by administration of naloxone [16, 27].

Electrical stimulation of the nervous system may eliminate acute and chronic pain. An electrical stimulus can be delivered percutaneously, from the epidural space, or through electrodes implanted in the CNS.

Percutaneous electrical stimulation induces analgesia by stimulating thick afferent fibers. Indications to percutaneous stimulation include mild to moderate intensity pain, chronic back pain, arthritis pain and neuropathic pain [5, 32].

An analysis of the scientific literature showed that currently there are evidence-based diagnostic options for detection of pain origin, as well as a huge arsenal of drugs for the treatment of pain syndrome. Therefore, the possession of this knowledge and its systematic use by nurses working with patients with various diseases accompanied by pain is a very important skill.

CHAPTER 2
THE OBJECT OF RESEARCH AND METHODS OF STUDY

The object of the study were the patients of orthopedic, cardiological, general surgical and gynecological profile with various disease accompanied by pain syndrome, where pain intensity was assessed in the postoperative period.

When conducting the analysis of nursing process in anesthesiology, as well as when comparing pain intensity in patients of various profiles in the postoperative period, we have used the methods of general clinical assessment general surgical and anesthesiological study methods, and collected history of present disease and health history of the patients. These data included life history of the patient, retrospective disease progression, observation, data on patients' mental health, physical examination, general health assessment, collection of information regarding main complaints, comparisons and analytical/statistical as well as laboratory, instrumental and imaging tests.

The method of pain assessment. The study of such subjective symptom as pain does not have an unambiguous interpretation by different people. When defining the criteria for a good surgical outcome, most surgeons agree that pain relief is the main parameter that determines an outcome as "good". However, it is difficult to assess which improvement on an visual analog scale corresponds to a clinically meaningful improvement. Positive changes in performance status, activities of daily living and returning to work are the second most frequently mentioned criteria for a positive outcome. Most patients also expect substantial or complete pain relief as a result of surgical intervention. This is why we see assessment of pain syndrome as one of the main criteria in surgical studies.

Assessment of pain severity. International Association for the Study of Pain (IASP) gave the following definition to the phenomenon of pain: "an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage". The measurement of the severity (i.e. intensity, strength) of pain is different from measuring the impact

of pain on overall well-being, i.e. the “pain affect”. The severity of pain is determined by how much a person suffers, while “pain affect” is a more complex concept, which reflects a pain-altered mental condition of an individual and the overall impact of pain on the individual’s quality of life. The assessment of pain severity is relatively well-explored, while many outstanding issues remain in the concept of “pain affect” assessment. Therefore, it is impossible to roughly divide the questionnaires and scales into those that exclusively assess pain severity and those that assess only quality of life.

This study consisted of patient observation and data analysis. In the first part of the research work, we have conducted a study and analysis of the number of patients with various disease who have had surgical interventions and determined the intensity of pain syndrome on the 2nd day after the operation. In this part of the research work, 87 patients were enrolled. We divided all patients into four groups depending on the profile of their disease:

Group 1: Orthopedic profile (24 patients)

Group 2: Heart surgery profile (13 patients)

Group 3: General surgery profile (31 patients)

Group 4: Obstetrics and Gynecology (19 patients)

In the second part of the research work, we have conducted a comparison of the intensity of pain syndrome in patients of various surgical profiles.

As a next step, we have conducted data analysis, comparisons and data summarization with inferencing.

CHAPTER 3
ORGANIZATION OF AND THE PRINCIPLES GUIDING PREOPERATIVE PREPARATION OF PATIENTS WITH PAIN

Preoperative preparation and patient care in patients with pain syndrome is an important part of surgical treatment, which requires an inter-disciplinary approach. In a hospital setting, the implementation of solution for this issue calls for a coherent work of health care personnel, pharmacy personnel and hospital kitchen, as well as the availability of the required materials and an appropriate environment. Preoperative preparation and patient care in patients with pain syndrome may occur in very different settings. These may include the following: out-patient centers, surgical departments, intensive care units, doctor's offices and any facilities where surgical or invasive procedures are performed.

In some hospitals, there are also post-anesthesia care facilities, often abbreviated as PACU (post-anesthesia care unit) to provide care to patients recovering from anesthesia. Sometimes such units are called post-anesthesia recovery units, or simply recovery rooms, and they are vital parts of hospitals, day surgery centers and other healthcare institutions. This is usually an area adjacent to operating rooms, which is intended to provide care to patients in their recovery period after general anesthesia, regional anesthesia or local anesthesia.

Perioperative care includes three phases, which are divided by a surgical intervention: preoperative, intraoperative and postoperative.

Registered nurses are responsible for preparing the patients to surgical and/or invasive procedures, which require anesthesia.

There are certain age-related special aspects to this problem. According to estimates, by 2030, 20% of Americans will be over 65 years of age, and one in every four older individuals will be over 85 years of age. Meanwhile, 21% of patients above 60 years of age will have surgery and anesthesia compared to 12% of people between 45 and 60 years of age. Despite the large counts of elderly patients who have had surgeries, the measures of mortality and incidence

of disease are declining. It appears that with improvements in perioperative care, advanced age has become a less important factor to predict negative outcomes. Better understanding of the associated risk factors leading to perioperative complications may help healthcare providers to reduce the risk even more.

The preoperative phase begins when a decision to perform the surgery has been made, and ends when the patient has been transferred to the surgical table in the operating room. Preoperative assessment of pain syndrome and making a decision concerning the plan of preparation to anesthetic management during the procedure is usually performed a few days before surgery, in an outpatient setting. Presently, the majority of surgical patients are admitted to the hospital in the morning on the day of surgery. However, there are occasions when the preoperative phase begins in a medical-surgical department or in emergency department. The first stage (preoperative preparation) for all patients where a surgical and/or invasive procedure has been planned, begins with assessment of the patient and their charts before transporting them to the surgical department. This ensures an accurate two-identifier patient identification, identification and marking of the surgical site, adequacy of preoperative preparation of the patient and completeness of documentation. This allows assessment of actual and potential health problems in the patient and facilitates the fulfillment of perioperative treatment plan.

A thorough medical preliminary assessment and appropriate interventions may prevent or minimize procedure-associated complications. Preoperative assessment is important for early detection of problems and for prevention of postoperative complications or deviations from normal.

Sometimes primary nursing assessment is performed during the visit prior to hospitalization, which may also include preoperative training and outpatient testing. However, it is very important that medical examination be repeated in the morning prior to surgery. This assessment should include, at a minimum,

vital signs, respiratory status, assessment of the level of consciousness, and analysis of preoperative testing results.

Preoperative psychosocial assessment is aimed at identification of potential or actual sources of patient anxiety, such as changes in sleep patterns, increased heart rate and respiratory rate, increased sweating, and frequent urination. It includes the patient's understanding of the surgical procedure, previous surgical experience, special concerns or feelings about the operation, and religious feelings that may contribute to anxiety.

Fear can take many forms, including fear of the unknown, of loss of control, of losing the significant others' affection, the threat of loss of sexuality as a result of surgery, the fear of a cancer diagnosis, fear of anesthesia; fear of death, severe pain or disfigurement; fear of permanent restrictions after the surgery and of loss of previous lifestyle (e.g., employment, outdoor activities), as well as fear of current and future financial problems.

Preoperative physical assessment is aimed at making the surgery safe and comfortable for the patient. This, again, will be different from the assessment on admission. The nurse should concentrate on objective data obtained after making the decision concerning the surgery.

The health team member will need to ask the patient about their smoking status. The patient should be requested to abstain from smoking on the day of surgery. In order to prevent respiratory complications, it is best to ask the patient to quit smoking 4-6 weeks in advance of an elective surgery. Many researchers have demonstrated a correlation between smoking and poor wound healing. Smoking increases postoperative respiratory complications by reducing the amount of available functional hemoglobin and impairs oxygen delivery to tissues. Smoking is associated with such surgical complication as pulmonary atelectasis; a research study has shown that smoking doubles the risk of postoperative pneumonia.

The nurse should carefully examine patients with lung problems, i.e. assess the respiratory sounds and chest movements. Chest X-ray imaging is

administered based on history and not age. Chest X-ray imaging should also be performed once a year in elderly patients (i.e. those aged 60 years and above) and in patients with lung disease. Patient-specific factors that increase the risk for postoperative pulmonary complications include chronic lung disease, morbid obesity and smoking.

The nurse should find out whether the patient had respiratory allergic disease such as asthma or hay fever, and whether the patient has a history of any anesthesia-associated problems after any previous surgical operations. This may affect the choice of anesthetics. Also, the nurse should find out if the patient has chronic obstructive pulmonary disease (COPD). This disease increases the risk of complications and may require preoperative intervention to rectify an electrolyte imbalance, to prevent postoperative respiratory infection or removal of excessive mucus. To find out if the patient has upper or lower respiratory tract infection. The nurse should notify the physician of such an infection, since this may necessitate delaying the procedure. Anesthesia increases bronchial secretion in addition to the congestion already present in a patient with respiratory infection. This has a strong adverse impact on ventilation function of the patient's lungs.

Assessment of cardiovascular status.

Assessment of heart tones, and the frequency and rhythm of heartbeat, as well as the assessment of peripheral pulse, is a very important part of preoperative examination. ECG is ordered based on the patient's history and not age. If the surgical intervention is performed on large blood vessels or on extremities, attention should be paid to peripheral pulse. The patient will need a complete blood count and electrolytes (if the patient is undergoing a serious surgery, which may cause significant blood loss). The most significant test results the nurse will need to pay attention to include blood glucose level (wound healing capacity depends on this parameter), the indices that suggest adequate blood clotting, white blood cell count, indices of inflammation in the body and the risk for bacterial infection.

Assessment of renal and hepatic function.

The nurse should find out if the patient has any complaints associated with the infection of the kidneys or the urinary bladder. Such complaints include frequency, urgency, blood in the urine, burning on urination, fever or back pain, flank pain or suprapubic pain. Patients with signs and symptoms of urinary tract infection or kidney infection need a more thorough preoperative assessment. If kidney function is impaired due to an infection, postoperative stress may accelerate the manifestations of renal failure.

Liver disease impair the ability to excrete toxic metabolites, which are formed from the drugs administered in the preoperative period and during the surgery. It is important to pay attention to the results of hepatic function tests.

Kidneys eliminate anesthetics and their metabolites; therefore, a good kidney function is essential to maintain fluid and electrolyte balance. The nurse should review and evaluate the results of urinalysis in order to detect the following:

- albumin (elevated levels suggest kidney disease)
- glucose (elevated levels suggest diabetes)
- acetone (elevated levels suggest diabetes or malnutrition)
- bacteria (may suggest a urinary tract infection)

Assessment of immunological status.

The nurse should ask the patient if they have allergies to any foods, drugs, latex or soap, whether and how often they had asthma attacks (if the patient has a history of asthma). Many patients with asthma should receive preoperative treatment of these conditions.

Some allergic reactions can be fatal, and some can be severe enough to permanently damage vital organs. It is important for the surgical team to know prior to the procedure if the patient is allergic to iodine, hexachlorane, or latex. Allergic reactions to latex are becoming an increasingly important issue in preoperative care. However, patients are not always aware of their latex allergy. The nurse will need to ask them if they wear rubber gloves at home, if they may

have irritation from their underwear, and/or if they have problems when they try to inflate a balloon. The nurse will also need to check for latex-related food allergies, i.e. allergies to bananas, kiwis, chestnuts, papaya, mangoes and potatoes. Also, finding out about any unusual responses to anesthesia in the patient or in their relatives is very important.

A neurological examination of the patient makes it possible to find out the baseline, against which it will be possible to compare indicators in the postoperative period and to identify complications. It is necessary to assess the patient's cognitive level, language barriers (if any) and behavior, assess the strength and coordination of muscles in the arms and legs when walking, and assess orientation to space, time and person.

The nurse should find out if this patient is eligible to sign consents and authorizations, and if the patient has any signs or symptoms that may suggest serious neurological problems. Symptoms may include headache, numbness or tingling in the limbs, tremor or weakness in the limbs, unsteady gait, confusion, or memory loss. It is important to document any preoperative neurological disorders in order to compare them with postoperative assessment. Neurological and behavioral changes may result from postoperative effects of anesthetics, analgesics or sedatives. This is especially true of the elderly patients.

It should be kept in mind that chronic alcohol abuse suppresses the responses of the adrenal cortex to surgical stress. If the patient does not admit to drinking heavily and the nurse has concerns that they may be an alcoholic, the nurse should share these concerns with the doctor. Patients with alcohol abuse are at higher risk for tremor and delirium at withdrawal and other complications.

The nurse should find out if the patient complains of having any gastrointestinal symptoms. Such symptoms may include nausea and vomiting, diarrhea, constipation, regurgitation of blood or blood in the stool. These symptoms may suggest peptic ulcer, inflammatory bowel disease or diverticular disease. Anesthesia and analgesic drugs affect the function of gastrointestinal tract. Therefore, preoperative evaluation is necessary for comparison after

surgery to determine whether any problems were caused by the medication or were preexisting.

The nurse should check blood glucose level at the patient's bedside (especially if the patient has diabetes) and report any pre-procedure deviations form normal to the doctor. Diabetes puts the patient at risk for slow wound healing, postoperative surgical infection, hypoglycemia and hyperglycemia.

The nurse should ask the patient about any preexisting disease such as liver disease, diseases of the respiratory tract, kidneys, heart, endocrine system and blood.

The nurse should find out about the use of the drugs, which may impede anesthesia or contribute to postoperative complications, such as bleeding, and ask the patient about the use of herbal supplements. More and more people are using herbs and vitamins and they are not always proactively providing this information. Other important questions include questions about problems with hearing or vision. The nurse should document the drugs that the patient is taking regularly, including over-the-counter drugs, and herbal drugs. Clopidogrel, anticoagulants and non-steroidal anti-inflammatory drugs interfere with blood clotting and increase the risk for bleeding.

It is important to collect dietary history from the patient, in order to assess their diet and nutritional status. The nurse should ask about bowel movements in order to detect constipation or diarrhea, and ask the patient if they have any motor problems, especially difficulties when walking or moving arms and feet due to arthritis orthopedic surgery.

Other important questions include whether the patient is able to sleep well and to relax, what is the patient's level of pain or discomfort and what are their expectations concerning postoperative anesthesia, and to perform baseline pain assessment.

Older patients may be less capable of tolerating surgical stress, subject to their age-associated physiological changes and the presence of chronic disease.

Inadequate fluid intake or an incorrect diet can impair a patient's ability to bear the stress of surgery. It can also affect wound healing. Excessive food consumption and pronounced obesity also may complicate the surgical procedure and the postoperative period of the patient.

Lung disease may also affect the patient’s response to anesthesia and their capacity to cope with the respiratory problems in the postoperative period.

Cardiovascular disease may contribute to shock and fluid imbalance, while impairing blood pumping and constriction of blood vessels. Insufficient counts of red or white blood cells may increase the risk for bleeding or inflammation.

Renal insufficiency may deteriorate the excretion of electrolytes and waste products and increase the risk for fluid overload if urine output is insufficient.

Endocrine disease may slow down wound healing due to weakening of anti-inflammatory responses.

Disability that limits the patient’s activity, may increase the risk for postoperative atelectasis, pneumonia and thrombophlebitis.

The purpose of the preoperative psychological preparation is to reduce the patient's anxiety and to prepare them mentally for the operation. This will also reduce fear, since the fear of the unknown increases anxiety. Preoperative education can change negative attitude on part of the patient, affect postoperative recovery and improve satisfaction with care.

The recovery process should be explained to the patient, including the location where the patient will wake up, the care provided and supervision by the nurse, monitoring of vital signs, and the equipment used (O_2 therapy, O_2 saturation monitor and other instruments). Ask the patient to take deep breaths at least 3 times per hour and use an incentive spirometer at least every 2 hours while the patient is awake. Family members should be informed at what time the patient is expected to go to the operating room, and where they can wait during the operation for the doctor to contact them concerning the results of the operation.

When conducting preoperative patient education and preparation prior to hospitalization, all instructions to be followed by the patient should be thoroughly explained; for example, the need to have a bowel movement in the home the night before colonoscopy. On the morning of the procedure, the nurse should check whether the patient followed the instructions. Failure to perform adequate preoperative preparation may be a reason for postponing the procedure.

Some procedures require procedure-specific preoperative training, i.e. how to use a walker if the patient is going to have a hip replacement. These needs are determined in collaboration with the physician.

The anesthetic remains in the patient's body for at least 24 hours after the procedure; therefore, the patient should be warned not to drive or operate machinery, or make important decisions for 24 hours after the procedure.

The use of drugs before anesthesia as a premedication (preanesthetic medication) varies from institution to institution. It is usually given just before surgery in order to:

- Reduce anxiety
- Provide for sedation
- Induce amnesia
- Reduce pharyngeal secretion (swallowing reflex)
- Reduce the production of gastric acid
- Prevent allergic reactions to anesthetics

If preanesthetic medications have been prescribed, they are usually administered to the patient by the anesthesiologist before the patient arrives to the operating room. This is done only after all consents have been signed and confirmed.

Premedication should not be confused with preoperative medications such as antibiotics, inhalers, respiratory medications, antacids or H2 blockers, and/or antiemetics.

Conscious sedation may be given to a patient undergoing painful procedures. If the surgical authorization has not been not signed, ask the patient

to sign and date it. Informed consent is reached between the doctor and the patient through discussion. Surgical authorization contains the signature of the patient that confirms this consent. The information to be understood by the patient includes the definition of the procedure, as well as the potential complications and risks of the procedure. If the patient states that he has unanswered questions about the procedure or that they do not want to proceed with the procedure, the nurse is obliged to contact the doctor and inform him/her of this situation.

If the patient is incapacitated, permission may be requested from the patient's legal representative. Incapacitated patient is a mentally or physically incapacitated individual as determined by the physicians; such a patient is unable to state their preferences concerning their treatment. Institutional policy usually dictates the process for and number of physicians to be involved in the decision-making. If the consent is signed by the family or through a power of attorney, 2 witnesses are required. An informed consent document should be filed with the patient’s medical record and accompany the patient to the surgical office/operating theater.

In an emergency situation where the doctor believes that delaying the procedure would be imminently life-threatening for the patient and the patient is unable to give consent, the doctor may go on with the procedure without consent. This process requires extensive documentation and consultations with other physicians.

Informed consent must be obtained BEFORE the patient receives any preoperative drugs that cause sedation or amnesia, or reduce anxiety.

Mandatory conditions:

- Make sure the patient has actually been informed.
- The physician performing the operation must sign the consent.
- Make sure that the date and time are specified in the consent.
- In case of incapacitated patients, 2 witnesses are required.

During final preparation before transporting the patient to the operating room, preoperative checklist should be reviewed for documenting the nurse's activities, which include:

- Removing jewelry and other items
- Patient identity verification using 2 identifiers ensures that the surgical site is identified and marked with an "X"
- Asking the patient to empty their urinary bladder
- Check whether the necessary documents are available, including the medical record, physical examination record, consent form, test results, etc.
- Taking preoperative medication
- The most recent vital signs (taken not more than 1 hour ago).

Preoperative psychological preparation, patient education and assessment of the patient's condition by the nurse largely contribute to the success of the procedure. No surgery is risk-free; however, the rate of complications can be substantially reduced through adequate preoperative evaluation, preparation and documentation.

The chances to improve postoperative outcomes will be tangible if the risk factors of adverse events during anesthesia and surgery are taken into account and modified by the health team through careful preoperative patient preparation.

CHAPTER 4
ANESTHETIC MANAGEMENT OF SURGICAL PATIENTS WITH VARIOUS DISEASE

Modern surgical intervention is impossible without adequate anesthesia. The painlessness of surgical procedures is currently provided for by an entire branch of medical science referred to as Anesthesiology. This science deals not only with the methods of anesthesia per se, but also with the methods of controlling bodily functions in such a critical state as modern anesthesia. The armament of a modern anesthesiologist who comes to the aid of a surgeon, contains a large number of techniques: from relatively simple ones (such as local anesthesia) to the most sophisticated methods of controlling bodily functions (such as hypothermia, controlled hypotension, cardiopulmonary bypass, etc.).

Anesthesia (narcosis) is an artificially induced deep sleep with loss of consciousness, analgesia, inhibition of reflexes and muscle relaxation. It becomes clear that modern anesthetic management of surgical intervention, i.e. anesthesia, is the most complex multicomponent procedure, which includes:

1) Narcotic sleep (induced by anesthetic drugs), which includes the following:

a) turned-off consciousness, i.e. full retrograde amnesia (the memory may only record the events that happened to the patient during anesthesia);

b) reduced sensitivity (paresthesia, hypesthesia, anesthesia);

c) analgesia proper;

2) Neurovegetative block, which is required for stabilization of autonomic nervous system's reactions to surgery, since the autonomous part of the nervous system regulation is largely out of control of the CNS and is not manageable with narcotic drugs (therefore, this component of anesthesia is carried out by using peripheral effectors of the autonomic nervous system, i.e. anticholinergics, adrenoblockers, ganglionic blockers, etc.);

3) Muscle relaxation. In modern surgery, it is difficult to do without using muscle relaxants, which are used when providing anesthesia in patients with intubated trachea and cavitary procedures, especially in lung surgery (tracheal intubation with a dual-lumen tube allows ventilating one lung only). Muscle relaxants have a potential to potentiate the effects of other anesthetic components; therefore, the concentration of the anesthetic can be reduced in concomitant use. Apart from anesthesia, these drugs are used in the treatment of tetanus and in emergency therapy of laryngospasm.

4) Maintaining an adequate state of vital functions, such as gas exchange (achieved by accurate calculation of the ratio of the gas mixture inhaled by the patient), circulation and normal systemic and organ circulation. The status of blood flow can be monitored by blood pressure readings, as well as (indirectly) by hourly urine output (debit-hour of urine): this amount of urine should not fall below 50 ml/h. Maintaining adequate levels of blood flow may be possible through hemodilution, i.e. through a continuous intravenous infusion of saline solutions under the surveillance of central venous pressure.

5) Maintaining metabolic processes at a proper level. It is necessary to take into account how much heat the patient is losing during the surgery, and to carry out adequate warming or, conversely, cooling of the patient.

The indications for a surgical intervention under anesthesia are determined by the seriousness of the planned intervention and the condition of the patient. The more severe the health status of the patient and the more extensive the procedure, the more indications are there to use general anesthesia. Small procedures in a relatively satisfactory health status of the patient are performed under local anesthesia.

Classification of anesthesia by the route of administration of the narcotic substance into the body.

1. Inhalation anesthesia (gaseous narcotic substance is supplied into the respiratory system of the patient and diffuses through the alveoli into the blood):

- mask anesthesia (is poorly tolerated by the patients; therefore it is not used often, chiefly in small surgical interventions, which do not required muscle relaxation);

- endotracheal anesthesia

2. Intravenous anesthesia. This is a type of general anesthesia attained with modern non-inhalation anesthetics, i.e. with intravenous drugs (total intravenous anesthesia) or using other administration routes, e.g. intramuscular (intramuscular anesthesia). The advantages of intravenous general anesthesia include rapid induction of narcosis and the absence of agitation phase; moreover, the patient is falling asleep pleasantly. However, intravenous narcotic agents create a short-term anesthesia, which makes it impossible to use them as single agents for prolonged surgical interventions.

3. Combined anesthesia (as a rule, this includes induction anesthesia with an intravenous drug followed by inhalation anesthesia): this is a type of anesthesia attained via simultaneous or sequential use of different methods (e.g. inhalation and non-inhalation anesthesia). More recently, neuroleptanalgesia has become very popular. This method of anesthesia uses nitrous oxide with oxygen, fentanyl, droperidol, and muscle relaxants. Induction anesthesia is intravenous. Anesthesia is maintained by inhalation of nitrous oxide with oxygen and fractional intravenous administration of fentanyl and droperidol. This type of anesthesia is safer for the patient.

4. Individual types of anesthesia

Special methods, such as controlled hypotension and controlled hypothermia are used in combination with anesthesia. Controlled hypotension achieves a reduction in tissue perfusion, including that in the surgical site, which results in lower blood loss. Controlled hypothermia, i.e. lowering the temperature of the whole body or part of it leads to a decrease in tissue oxygen demand, which allows for long-term interventions with limited or switched off blood supply.

5. Special types of analgesia: neuroleptanalgesia (the use of a combination of an antipsychotic (droperidol) and analgesic (fentanyl)) and ataralgesia (using a tranquilizer and an analgesic for pain control). These methods can be used in small interventions.

6. Local anesthesia and its varieties: terminal anesthesia, infiltration anesthesia, conduction block, plexus anesthesia, epidural anesthesia, spinal anesthesia, caudal anesthesia, intraosseous anesthesia, and intravenous anesthesia under a tourniquet. The methods of conduction block, plexus, epidural, spinal, caudal, intraosseous and intravenous tourniquet anesthesia are combined into a group of regional anesthesia methods. Methods of regional anesthesia are characterized by achieving the anesthetic effect, “switching off” nerve impulse conduction in a particular nerve or a nerve plexus while keeping the patient conscious and spontaneously breathing. In some cases, this may be the only safe way to perform a surgery from the viewpoint of preserving vital bodily functions in patients with severe comorbidities, as well as in older patients.

General anesthesia (narcosis, multicomponent anesthesia) is a controlled drug-induced toxic coma, a condition characterized by temporary loss of consciousness, pain sensitivity and reflexes, and by relaxation of skeletal muscles. Conducting an anesthesia requires the presence of an anesthesiologist. This is a very complex procedure and a very serious interference with the functioning of the body. As a rule, a properly performed anesthesia is not accompanied by complications, but complications do occasionally happen even with experienced anesthesiologists.

The tasks solved by modern anesthesiological service can be defined as follows:

- creating optimal working conditions for the surgeon during the procedure, which determines the overall quality of surgical treatment;

- safe and effective pain control during the surgical intervention;

- ensuring and supporting the life of the patient before, during and after the surgical intervention;

- protecting the patient from aggressive environmental factors affecting their body (biological, infectious, physical, chemical, etc., including the factor of surgical aggression).

Anesthesiological patient care includes the following:

- preoperative assessment of patient's status, evaluation of anesthesiological and surgical risks;

- determination of the need for and conducting intensive care as required in order to prepare the patient for the surgery;

- administration of premedication (pharmacological preparation for anesthesia);

- selection of the anesthesia method and the required agents;

- anesthetic management of elective and emergency surgeries, dressing changes and complex diagnostic tests;

controlling the condition of the patients during anesthesia and conducting corrective therapy for the prevention and elimination of life-threatening functional and metabolic disorders;

- waking the patients after general anesthesia, unless there are indications for prolonged maintenance of medication sleep (induced coma);

- elimination of pain syndrome due to various causes (including incurable/terminal disease) using special methods.

It is worth mentioning that currently there are no restrictions for anesthesia in terms of age or in terms of somatic disease in the patient, with only indications or contraindications for using a particular type of anesthesia. The choice of the anesthetic technique is the prerogative of the anesthesiologist and is determined by the level of his/her professional training and experience.

The anesthesiologist examines the patient before the procedure and pays attention not only to the underlying disease for which the operation is to be performed, but also finds out the details of any concomitant disease. If the

patient is expected to have an elective procedure, then concomitant disease is managed as necessary and dental prophylaxis (oral cavity sanitation) is performed to eliminate potential sources of infection. The doctor collects the history of allergies (whether any drugs and substances are poorly tolerated by the patient), finds out if the patient has any history of surgical procedures and anesthesia, pays attention to anatomical features, including those of the face, chest and neck, and the amount of subcutaneous fat, since all these factors are important in selecting the proper anesthesiological method and anesthetic drugs.

An important rule in preparing a patient for anesthesia is the cleansing of the gastrointestinal tract (i.e. gastric irrigation, cleansing enemas). Prior to procedure, a special pharmacological preparation is performed in the patient, referred to as premedication. Sleeping pills are given shortly before bedtime, and tranquilizers may be used a day before surgery in patients with emotional instability. At 40 minutes before the procedure, opioid analgesics and 0.5 ml of 0.1% atropine solution are administered intramuscularly. Immediately before the onset of the procedure, the anesthesiologist/anesthesia nurse inspects oral cavity and removes dentures.

In course of general anesthesia, the anesthesia team is continuously monitoring and assessing the principal hemodynamic parameters. Blood pressure and pulse rate are controlled continuously; in a low-resource setting, where monitors are not available, these parameters are monitored at least every 10–15 minutes. In order to determine the level of anesthesia, BIS monitors can be used (BIS = Bispectral index), which measure the electroencephalographic depth of sleep and muscle relaxation in a patient. In order to control lung ventilation and metabolic changes during anesthesia and surgery, acid-base balance in the blood of the patient (PO2, PCO2, pH, BE) is monitored.

During the anesthesia, the anesthesia nurse is documenting the main homeostatic parameters, such as pulse rate, blood pressure, central venous pressure, respiratory rate, and mechanical ventilation parameters in the anesthesiological chart. This chart reflects all stages of anesthesia and of the

surgical procedure, and specifies the doses of narcotic agents and muscle relaxants. All drugs used during the anesthesia are documented, including transfusion media. The times of all stages of the operation and drug administrations are being documented. At the end of the operation, the total amount of all drugs used is determined, which is also documented in the anesthesia chart. A record about all complications in course of anesthesia and surgical procedure is made. Anesthesia chart is filed with the patient's medical record.

The objective of the nurse is to help the individual in his/her care to take such actions towards their health and recovery, which they would have taken themselves if they had the appropriate knowledge and will. And this is done in a manner which promotes the patient's regaining independence as soon as possible. The nurse takes the initiative and controls the implementation of this work. In addition to that, the nurse helps the patient to fulfill all orders made by their physician.

The nursing work in anesthesiology is subject to intensive physical and psychological challenges. This is partially because a nurse working in an anesthesia department should be, in a sense, a teacher, a psychotherapist, and a mentor at the same time.

A very important task of a nurse is keeping the physician updated on any deterioration in the patient's condition, in their test results, in monitor readings, and in fluid input/output imbalances, as well as documentation of these changes in the nursing record.

In course of care, it is important to remember not only the fundamental human needs of hydration, food, sleep, etc., but also the needs of a specific patient, including their habits, interests, and rhythm of life before their illness began.

The large volume of work requires that the nurses act swiftly and are highly professional when examining the patient, and when making decisions.

In this research study, in order to determine the intensity of pain syndrome in the postoperative period, we selected patients with diseases of various profiles and surveyed them. The survey was conducted on a 10-point scale, which the patients were using to quantity pain intensity in the postoperative period.

Patients of the following profiles were selected for the study:

- Orthopedic
- Cardiological
- General surgery
- Obstetrics and Gynecology

The survey was conducted on Day 2 postoperatively, to allow for a more accurate assessment of pain intensity, since on Day 1 the patients may still be under the influence of drugs used for anesthesia, and be non-objective in their assessment of pain.

In the orthopedic department, we surveyed 24 patients on Day 2 postoperatively. We were selecting the patients of this profile in a randomized fashion; therefore, their surgeries have been performed for a number of different orthopedic diseases or conditions.

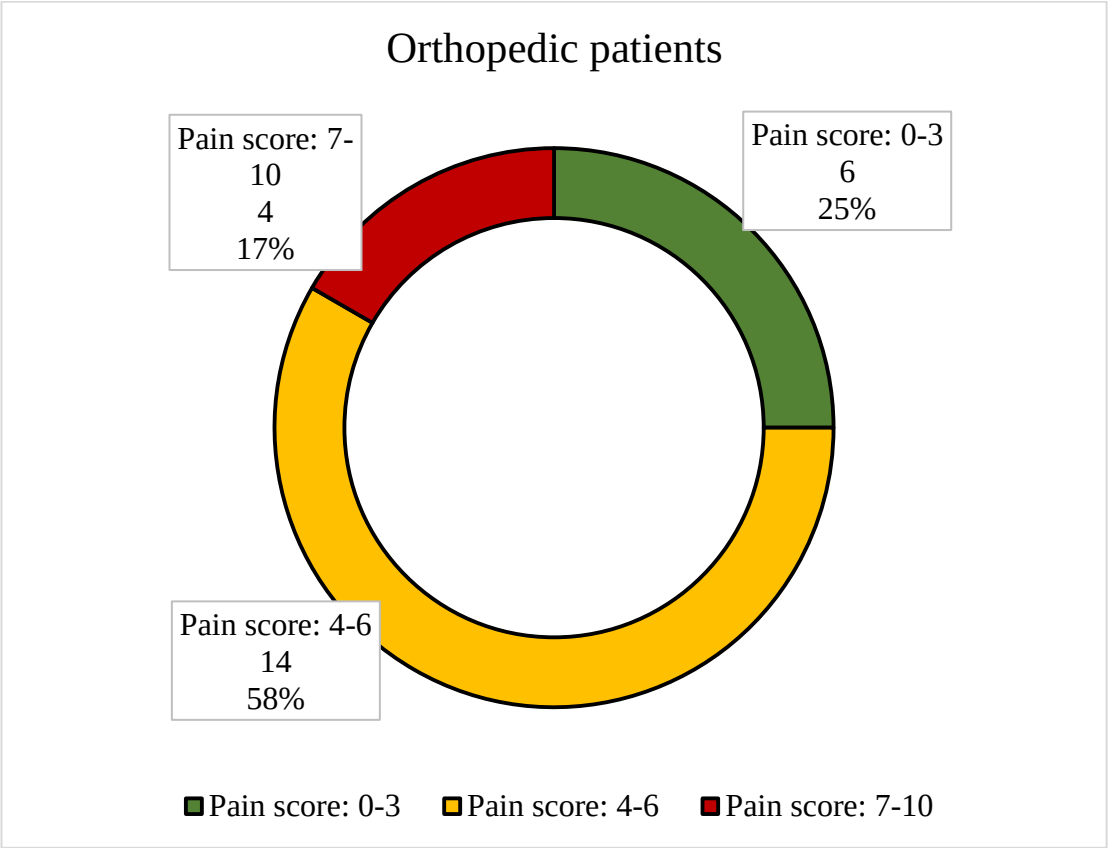

Diagram 4.1. Determination of the intensity of pain experienced by orthopedic patients in the postoperative period

In the heart surgery department, we surveyed 13 patients postoperatively. Surgical interventions have been performed in patients with various cardiovascular disease. Patients were asked to assess the intensity of pain syndrome on Day 2 postoperatively.

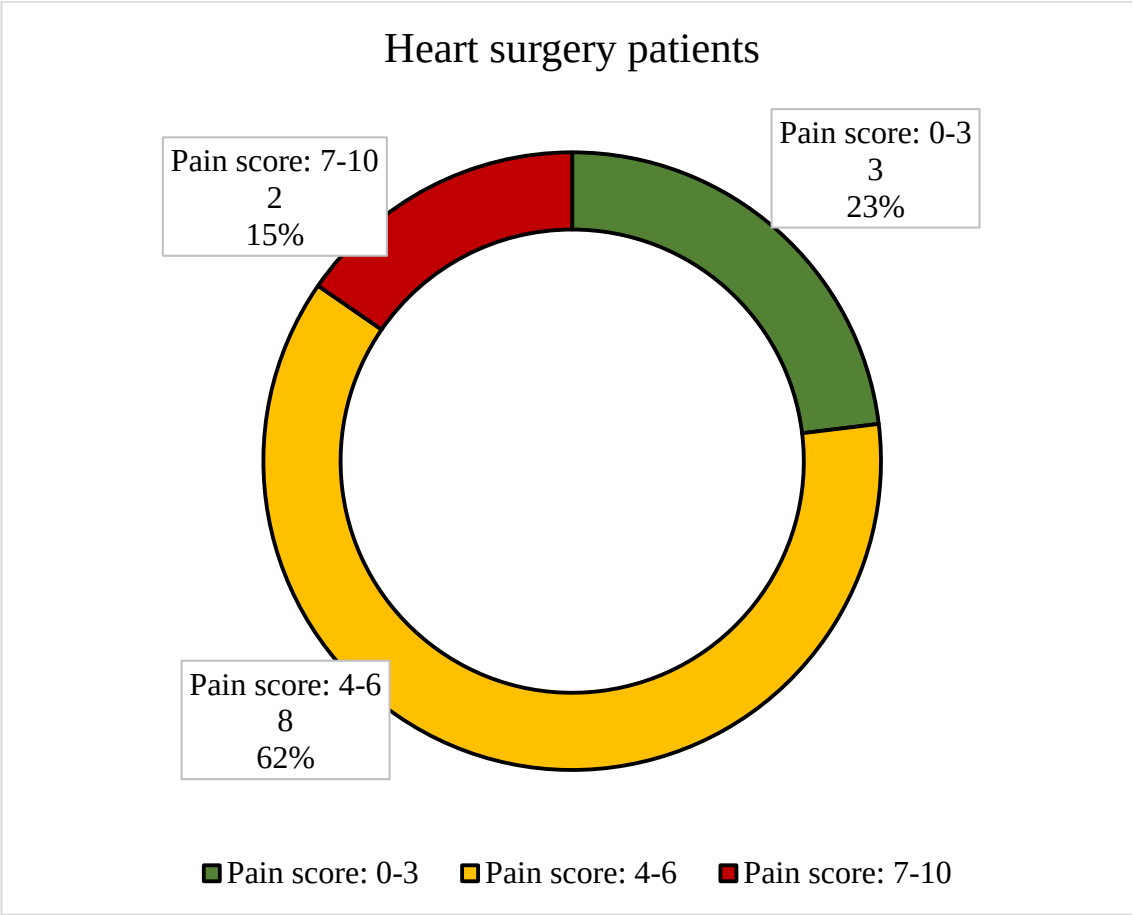

Diagram 4.2. Determination of pain intensity in heart surgery patients in the postoperative period.

In the general surgery department, we surveyed 31 patients on Day 2 postoperatively. We have selected the patients regardless of their underlying disease in order to assess the intensity of overall pain syndrome in general surgery.

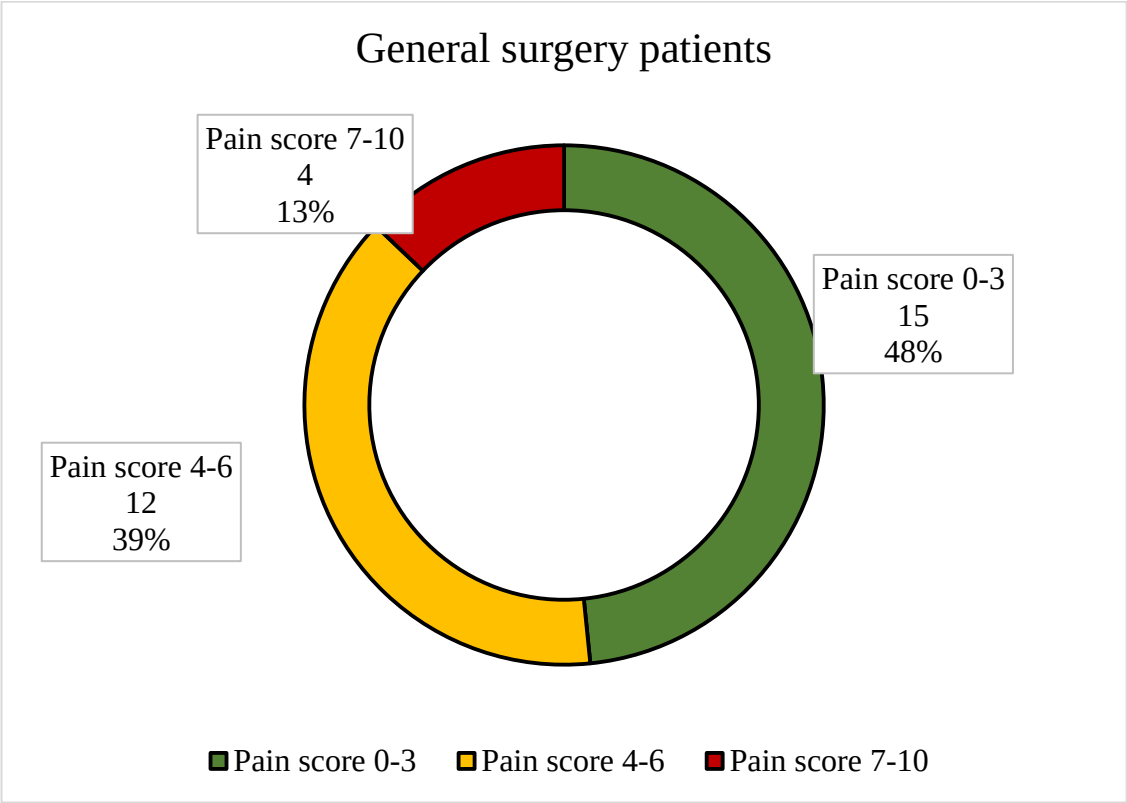

Diagram 4.3. Determination of pain intensity in general surgery patients in the postoperative period

In the Obstetrics and Gynecology department, we surveyed 19 patients on Day 2 postoperatively. We were selecting the patients of this profile in a randomized fashion; therefore, their surgeries have been performed for a number of different obstetric and gynecological indications that required surgical treatment.

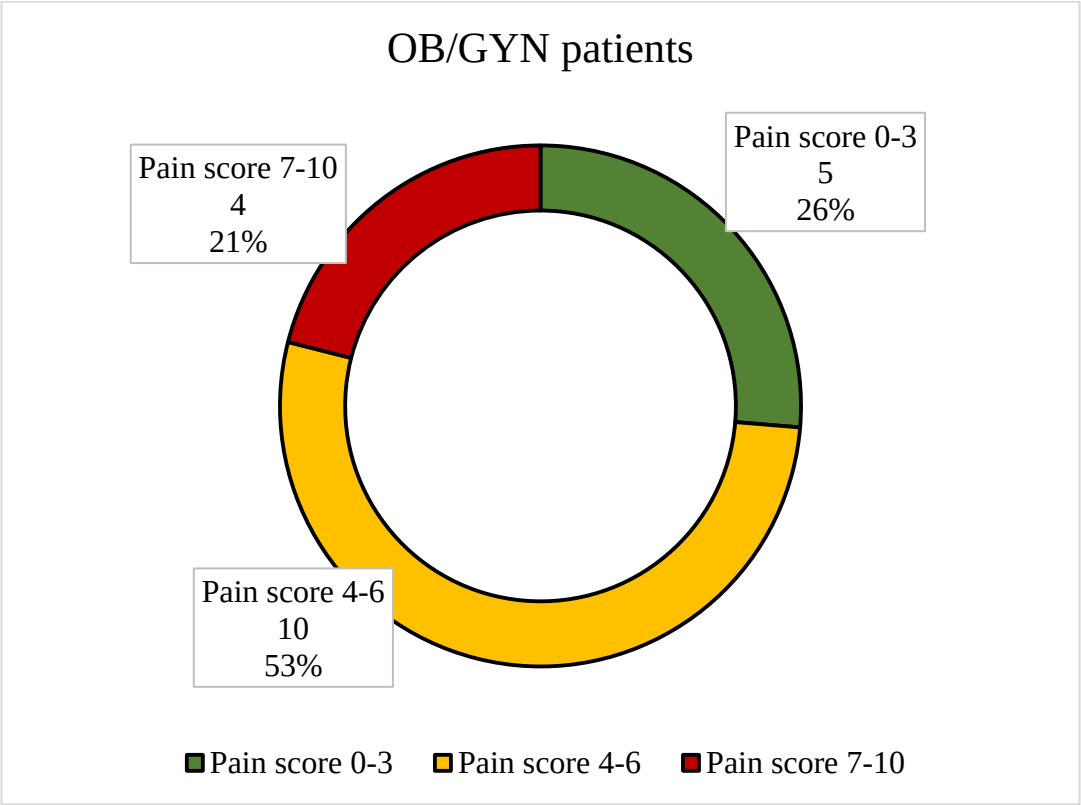

Diagram 4.4. Determination of pain intensity in obstetric and gynecological patients in the postoperative period

In all cases, the analgesic agents were prescribed by the treating physician or by the anesthesiologist; in 80% of cases, there was additional use of non-steroidal anti-inflammatory drugs, with minimal use of opioid analgesics, i.e. in 20% of the patients. The methods of anesthesia used in this study included the following balanced general anesthesia, neuraxial block and a mixed technique. When a mixed technique was used, pain control was more effective.

CHAPTER 5
POTENTIAL ANESTHESIA-RELATED COMPLICATIONS AFTER THE SURGERY

There are many potential side effects associated with the use of anesthesia for surgeries and procedures. They range widely from minor problems to serious and potentially life-threatening complications.

Serious side effects caused by anesthesia are rare, and most people experience none to minor problems for several hours to days after the procedure. However, the risk of anesthesia-associated complications is higher if the patient has a brain condition, cardiovascular disease, lung or kidney disease and/or abusing alcohol or drugs, smokes, and has an allergy to anesthetics or a family history of such allergy.

The type and the severity of adverse effects of anesthesia experienced by the patient may be influenced by such factors as:

- Current health status and the history of present disease
- The type of anesthesia used
- The duration of anesthesiological support
- The type of the procedure

For example, an otherwise healthy child under one-hour anesthesia for an appendicitis surgery is likely to have less complications if any compared to an 85-year old patient with diabetes who is going to be under anesthesia for several hours during an open-heart surgery.

General anesthesia is used for procedures performed in a hospital or in a surgical center. Medications are administered both as an inhaled gas and as an intravenous drip before and during the surgery. During this type of sedation, the patient is completely unaware of their surroundings and does not feel any pain, because they are in an unconscious state, which is much deeper than sleep.

In general anesthesia, an endotracheal tube is in place in the patient’s throat and trachea to allow for continuous mechanical ventilation during the procedure.

This is necessitated by the fact that general anesthetics paralyze muscles in the body, including the respiratory muscles.

Muscle paralysis is very important during major surgical procedures, but in addition to its apparent procedural benefits, it may cause complications due to prolonged immobility.

The risks associated with general anesthesia are not the only risks the nurse should be aware of before the procedure; there are also risks associated with the procedure per se. Each procedure has its own characteristic potential risk factors, which are not associated with anesthesia.

For example, a patient after appendix removal surgery is at risk for dissemination of infection from the appendix, as well as at risk for infected incision, which is obviously not related to general anesthesia.

Problems associated with general anesthesia should normally reverse within several hours. The surgical team is at constant vigilance to prevent these problems before and during the surgery, and then monitors the patient for signs of emerging problems and manages them (if they do occur) after the procedure.

The most frequent complications after general anesthesia include nausea and vomiting. Postoperative nausea and vomiting is easier to prevent than to treat. A number of drugs can be used for both prevention and treatment.

The best predictor of whether or not the patient will experience postoperative nausea and vomiting is a history of nausea and vomiting after a previous surgical procedure. People who had it in the past are much more likely to experience it again; as a rule, they are given prophylactic antiemetics to prevent the recurrence of this condition.

After breathing tube has been in place, the patient may experience a sore throat or a hoarse voice, especially if the procedure was a long one. While this is usually impossible to prevent, sore throat sprays, lozenges, and other drug products used to relieve sore throat are suitable in the first days after the surgery.

Dry mouth may result from the fact that the patient could not eat or swallow for a few hours; other causes of dry mouth may include the effects of

some medications used. This should disappear within 24 hours after the surgery, and water or ice can be used to relieve this sensation.

Shivering or chills is a common response to medications administered during the surgery; this symptom usually goes away when the effect of the medication wears off. This may also be caused by a small drop in body temperature during the surgery. This problem can be solved by warming the patient, e.g. by wrapping them in additional blankets until the shivering goes away.

Fever may be another cause of chills and shivering. However, it less frequently seen immediately after a surgical intervention, unless in a preexisting infection before the procedure.

The drugs used for general anesthesia are usually causing drowsiness, and many people are dozing for a few hours after the surgical procedure.

Paralytic drugs commonly used with general anesthesia, may often cause muscle aches. Full immobility during the surgery may also cause soreness. Patients usually complain of body aches after the surgery, usually of back pain due to inability to change position during the procedure.

For the first few hours after the surgery, the patient will have frequent postoperative checks. If a patient has signs of a serious complication during the recovery period, immediate treatment may be required.

After surgery, the patient's mental state may change, with symptoms of confusion or agitation. This is especially common in older people with Alzheimer's disease or with other types of dementia or cognitive problems.

When the effects of anesthetic drugs are combined with major cognitive problems, this usually leads to increased disorientation that persists until the body is completely free from the effects of anesthesia. Changing home environment to an unfamiliar setting (a hospital or a surgical center) may aggravate the confusion.

Being in an intensive care unit is a known risk factor for complications such as delirium and confusion, since the patient is continuously stimulated with light

any time of day and night, with alarm signals and the perpetual sounds emitted by technical appliances and medical equipment.

General anesthesia paralyzes the muscles of the urinary bladder. In addition to that, many surgical procedures involve the insertion of a Foley catheter (urinary catheter) for collection of urine during the procedure.

After the urinary catheter has been removed, the patient may find it difficult to urinate independently in the subsequent days.

The irritation that frequently accompanies the insertion of a Foley catheter, may lead to burning sensation on urination. This does not necessarily imply the presence of a urinary tract infection.

Although urinary tract infection is more likely after a Foley catheter has been inserted, the majority of patients do not experience any adverse effects. In rare cases, a patient may be unable to void after the surgery, and this calls for an immediate medical intervention.

Anesthetic drugs can affect the functioning of the urinary bladder and the intestines. When normal intestinal motility is not restored within one to three days after the procedure, this is referred to as intestinal obstruction (postoperative ileus). This problem is usually resolved within four to five days after the procedure.

In most patients, the breathing tube is removed as soon as the surgery is complete and they can breathe spontaneously. This occurs within a few minutes after completion of the procedure. Other patients, often elderly or more severely ill, may need more time to be successfully weaned from mechanical ventilation.

The patients that cannot be safely taken off mechanical ventilation immediately after the surgery, may be taken off in a few hours. In rare occasions, a patient may need a longer stay in an intensive care unit while the medical team is working on restoring the patient’s spontaneous breathing.

This is a potentially serious problem, which occurs in accidental inhalation of saliva, food or fluid into the lungs during the procedure. This is why the patient is asked to refrain from eating and drinking anything for a certain number

of hours before the procedure: undigested gastric contents may regurgitate from the stomach to the lungs due to anesthesia-induced weakness of the gastroesophageal sphincter, which normally prevents food from moving backwards from the stomach. Abstaining from food reduces the likelihood of food or fluid from the stomach entering the lungs.

Being unconscious during general anesthesia makes the person unable to protect their airways by reflexes such as vomiting and coughing; in this situation, saliva or vomit may enter the lungs.

This may lead to postoperative pneumonia, which is considered a serious complication requiring antibacterial therapy and, in some cases, repeated hospitalization.

Being in the same position for several hours during the procedure may increase the risk for postoperative blood clot formation, known as deep vein thrombosis. These blood clots are most frequently developing in the extremities, especially in the legs.

This may be caused by a serious disease caused by a genetically inherited tendency of abnormal response to certain medications used during anesthesia, which may be life-threatening. This condition causes increased body temperature and muscle contractions, which may lead to organ failure unless this condition is timely diagnosed in the patient.

CHAPTER 6
ASSESSMENT OF PAIN INTENSITY IN THE POSTOPERATIVE PERIOD OF PATIENTS WITH VARIOUS ORTHOPEDIC, CARDIOSURGICAL, GENERAL SURGICAL AND GYNECOLOGICAL DISEASES

Chronic postoperative pain (CPP) is an adverse side effect which may occur after any surgical procedure. It leads to functional limitations and psychological trauma in the patients; in addition, it leaves the surgical team with a sense of failure. Therefore, it is very important that preventive strategies be considered in high-risk operations. Various methods have been implemented to reduce risk with varying degrees of success. Identification of risk factors for each patient and timely implementation of a prevention strategy can help patients avoid the suffering associated with chronic pain.

Preventive strategies include modification of surgical technique, good preoperative pain control and preoperative psychological interventions focusing on psychosocial and cognitive risk factors. Appropriate patient management in CPP is also essential to relieve the suffering associated with this condition.

The therapeutic goal in management of postoperative pain is not only to relieve suffering or discomfort, but also ensuring early mobility after the surgery, reducing the risk of complications and reducing the duration of hospital stay. Not so long ago, the use of opiates was the main or even exclusive method of postoperative pain management. They are indeed quite powerful analgesics. However, due to their narrow margin of safety and a high risk of side effects (respiratory depression, prolonged sedation, nausea, vomiting, skin itching, urinary retention, intestinal motility disorders, etc.), they are not very suitable for achieving all of the aforementioned goals. The so-called multimodal approach to the treatment of postoperative pain has been proposed as an effective and safer alternative, which involves the use of several analgesic methods/agents, thereby affecting different links in the pathogenesis of pain syndrome. The schedule of anesthesia is developed on an individual basis depending on the procedure

performed, on the individual aspects and preferences of the patient, etc. Such strategy allows for a substantial reduction in opiate dose, and, in many cases, allows even eliminating opiates altogether.

In order to compare the intensities of pain syndrome, we have divided the study patients into 4 groups depending on their respective profile:

Group 1: orthopedic patients

Group 2: heart surgery patients

Group 3: general surgery patients

Group 4: gynecological patients

In order to perform an accurate measurement of the severity of pain syndrome in the postoperative period, we have selected patients with various disease and conducted a survey, which included a 10-point pain scale, where the patients assessed their pain from 0 (absence of pain) to 10 (the strongest pain they have ever experienced).

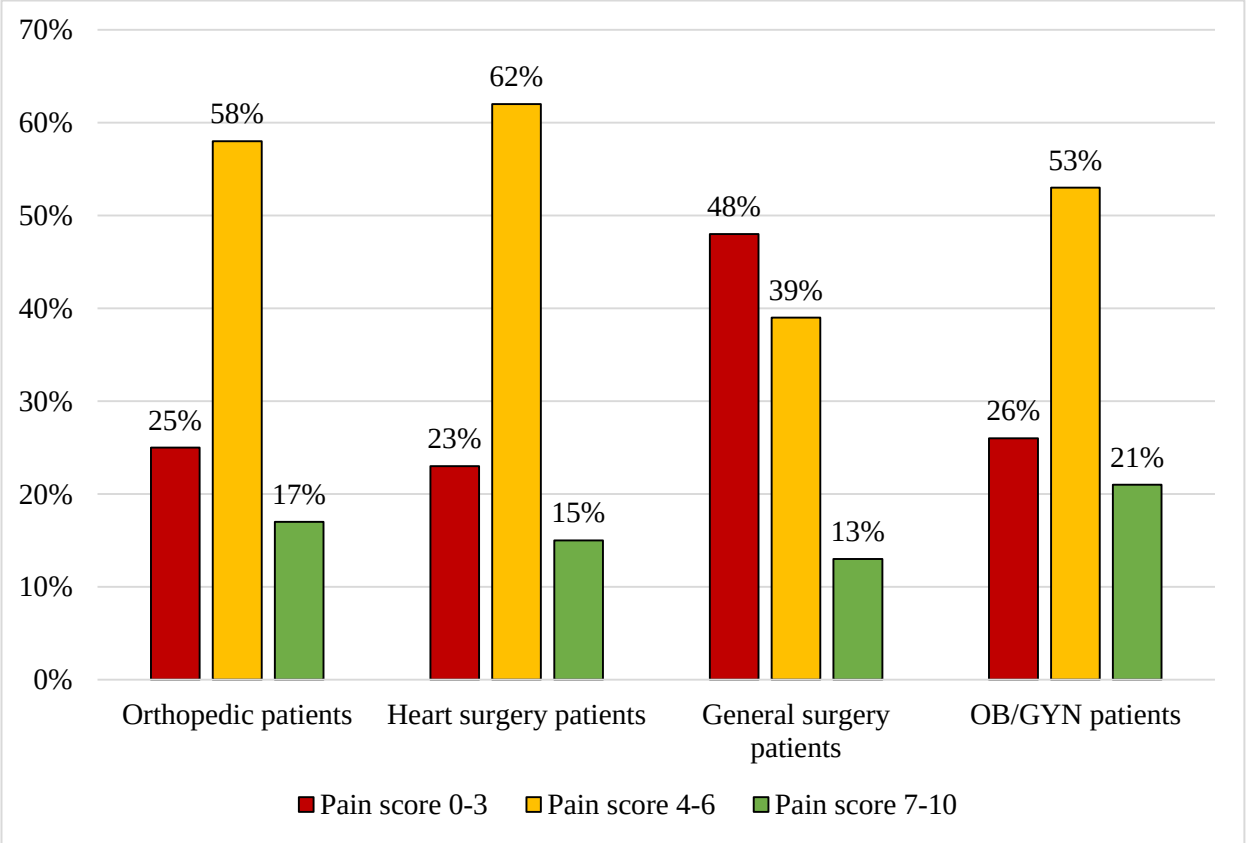

Diagram 6.1. Comparing the intensities of pain syndrome in patients of various profiles in percentage terms

A large number of scheduled surgeries allows predicting the likelihood of expected moderate to severe pain in patients who have experienced a pain of such intensity in our study. However, not enough preventive measures have been taken to avoid the onset of pain.

It should be pointed out that the follow-up of pain is a very important aspect of anesthesiological nursing practice, since it may greatly relieve the suffering of the patients, and improve their quality of care and quality of life during their hospital stay.

CONCLUSIONS

1. We have investigated the specific aspects of pain syndrome and the principles of its management in nursing practice.
2. The authors have investigated the main methods and principles of pain control in the patients.
3. We have determined the principles for preparation of patients with pain syndrome to surgical procedures.
4. The authors have studied the characteristic features of anesthetic management of surgical patients with various disease.
5. We have investigated the potential anesthesia-related complications after the surgery.
6. The authors have conducted comparison and analysis of pain intensity in the postoperative period of patients with various orthopedic, cardiosurgical, general surgical and gynecological diseases.

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