

MINISTRY OF HEALTH OF UKRAINE
ZAPORIZHZHIA STATE MEDICAL AND PHARMACEUTICAL
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DEPARTMENT OF MANAGEMENT AND ECONOMICS OF PHARMACY

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nicotine addiction»

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Youssef MOUTI

Scientific supervisor: Doctor of Pharmaceutical
Sciences, Professor, Head of the Department of
Management and Economics of Pharmacy

Natalia TKACHENKO

Reviewer: Candidate of Pharmaceutical
Sciences, Associate Professor of the Department
of Management and Economics of Pharmacy

Olha LYTVYNENKO

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ANNOTATION

The qualification thesis is devoted to the study of current issues related to the involvement of pharmaceutical professionals in the prevention and management of tobacco dependence. Given the high prevalence of smoking among the population and its significant medical and social consequences, smoking cessation requires a multidisciplinary approach in which the pharmacist plays an important role.

The study provides a systematic analysis of the product assortment, brand structure, and pricing characteristics of the Ukrainian pharmaceutical market for medicines used in the treatment of nicotine dependence.

A sociological survey conducted among practicing pharmacists made it possible to assess their level of awareness of smoking cessation methods, national and international tobacco control programs, as well as the role of the pharmacist in this process.

The necessity of expanding pharmacists' professional competencies in this field, enhancing educational and awareness-raising activities, and improving the affordability of nicotine replacement therapy has been substantiated. The study confirms the significant potential of pharmacists as members of a multidisciplinary team in combating tobacco use and improving public health.

The master's thesis comprises 55 pages of typewritten text and includes an introduction, a literature review, two main sections, general conclusions, a list of references, and appendices. The work is illustrated with 6 tables, 17 figures, and 3 formulas. The list of references contains 35 sources.

Keywords: smoking, pharmaceutical care, pharmaceutical specialist, pharmacy.

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LIST OF CONVENTIONAL ABBREVIATIONS

ATP – anti-tobacco products

WHO – World Health Organization

NRT – nicotine replacement therapy

NCDs – non-communicable diseases

MD – medical devices

PhA – pharmaceutical assistance

PhO – pharmaceutical organization

PhS – pharmaceutical service

PhM – pharmaceutical market

INTRODUCTION

There are currently an estimated 1.13 billion smokers worldwide, and approximately half of them will die from smoking-related diseases, the vast majority of which are noncommunicable diseases (NCDs) such as lung and heart disease or cancer. Tobacco use is a preventable cause of death. Each year, about 8.7 million people die as a result of tobacco use, and an estimated USD 1.4 trillion is lost due to healthcare costs and reduced productivity. Tobacco use is also a direct cause of NCDs, including lung cancer, cardiovascular disease, and chronic obstructive pulmonary disease [1].

There is a wide range of tobacco products, including conventional products such as cigarettes, cigars, roll-your-own cigarettes, pipes, and water pipes, as well as novel products, such as electronic nicotine delivery systems, with e-cigarettes being the most common type. This range also includes smokeless tobacco products, such as chewing tobacco, dry snuff, moist snuff, and soluble tobacco products [2]. According to the World Health Organization (WHO), more than 8 million people die each year from tobacco use. Of these deaths, approximately 1.2 million result from exposure to secondhand smoke, usually among individuals who are in frequent and close contact with chronic smokers. Furthermore, tobacco use represents a major public health problem, as tobacco is inherently toxic [3].

Continued commitment to the full implementation of the WHO Framework Convention on Tobacco Control, including Article 14 on tobacco dependence and cessation, is essential to protect and strengthen the progress achieved to date. Pharmacists play a crucial role in supporting current tobacco users in their efforts to quit smoking [4].

All of the above confirms the relevance of conducting research in this area.

The purpose of the master's thesis is to comprehensively assess the current state of pharmaceutical care for Ukrainian patients with nicotine dependence and to identify ways to improve the provision of such care.

To achieve this aim, the following objectives were set:

- to review and critically analyze the scientific literature on contemporary approaches to smoking cessation and to identify the impact of tobacco use on the human body and associated health risks;
- to examine the regulatory and legal framework governing the provision of nicotine replacement therapy to tobacco users, with particular emphasis on the pharmaceutical component;
- to study the structure of the Ukrainian pharmaceutical market for smoking cessation products, including their assortment and brand composition;
- to analyze the physical and economic accessibility of smoking cessation products for the population of Ukraine;
- to assess the level of readiness of Ukrainian pharmacists to provide pharmaceutical care in smoking cessation

Object of research: system of pharmaceutical assistance (PhA) for quitting smoking in Ukraine and the world.

Subject of research: Ukrainian pharmaceutical market of anti-tobacco products (ATP), physical and economic accessibility of drugs of this market segment for Ukrainian consumers.

Research methods: when performing the qualification (master's) work, the methods of content analysis, comparison, measurement, synthesis, questionnaires, as well as analytical, graphical, economic and mathematical methods, and generalization methods were used.

Practical significance and novelty of the obtained results. The practical significance and novelty of the results lie in the compilation of a comprehensive body of information on the legal aspects of providing pharmaceutical care to patients with tobacco dependence, the current range of smoking cessation medicines classified under the ATC system, and the calculation of indicators of their accessibility for Ukrainian consumers. The study applies a comprehensive approach to analyzing the pharmaceutical market, thereby expanding the potential role of pharmacists in the provision of pharmaceutical care.

Scope and structure of the work. The master's thesis comprises 55 pages of typewritten text and includes an introduction, a literature review, two main sections, general conclusions, a list of references, and appendices. The work is illustrated with 6 tables, 17 figures, and 3 formulas. The list of references contains 35 sources.

SECTION 1
THEORETICAL AND APPLIED ASPECTS OF THE IMPACT OF
TOBACCO SMOKING ON HUMAN HEALTH
(Literature Review)

1.1. Medico-chemical results of the impact of tobacco on the human body

The greatest harm to human health and the environment is caused by smoke inhaled during tobacco use. Therefore, it is necessary to examine in greater detail the composition and characteristics of tobacco smoke.

Tobacco smoke is a form of air pollution that is hundreds of thousands of times more harmful than emissions from metallurgical or chemical plants; nevertheless, people knowingly inhale such polluted air [5].

During smoking, dry distillation and incomplete combustion of dried tobacco leaves occur, regardless of whether they are used in their natural form (rolled into a tube), in cigarettes, or in pipes. Slow combustion produces smoke, which is a non-homogeneous (heterogeneous) mixture consisting on average of approximately 60% various gases and 40% microscopic tar droplets (aerosols).

The gaseous fraction of tobacco smoke contains, in addition to nitrogen (59%) and oxygen (13.4%), carbon dioxide (13.6%), carbon monoxide (4%), water vapor (1.2%), hydrogen cyanide (0.1%), as well as nitrogen oxides, acrolein, and other hazardous substances. The aerosol fraction of the smoke includes water (1.4%), glycerol and alcohols (0.1%), aldehydes and ketones (0.1%), hydrocarbons (0.1%), phenols (0.003%), nicotine (0.002%), and other components [5].

According to their predominant effects, the harmful substances contained in tobacco smoke that affect the human body (Fig. 1.1) are classified into four groups [6]:

1) Irritant substances: unsaturated aldehydes, primarily propenal (acrolein); carbon monoxide.

2) Carcinogenic substances: aromatic hydrocarbons, benzo[a]pyrene, phenols; organic compounds (nitrosamines, hydrazine, vinyl chloride, toluidine, etc.); inorganic compounds of arsenic and cadmium; and radioactive substances, including polonium-210, lead-210, and bismuth-210.

3) Toxic alkaloids: a total of 12 compounds, including nicotine, nornicotine, nicotyrine, nicotine, nicotimine, and others.

4) Toxic gases: carbon monoxide, hydrogen sulfide, hydrogen cyanide, and others.

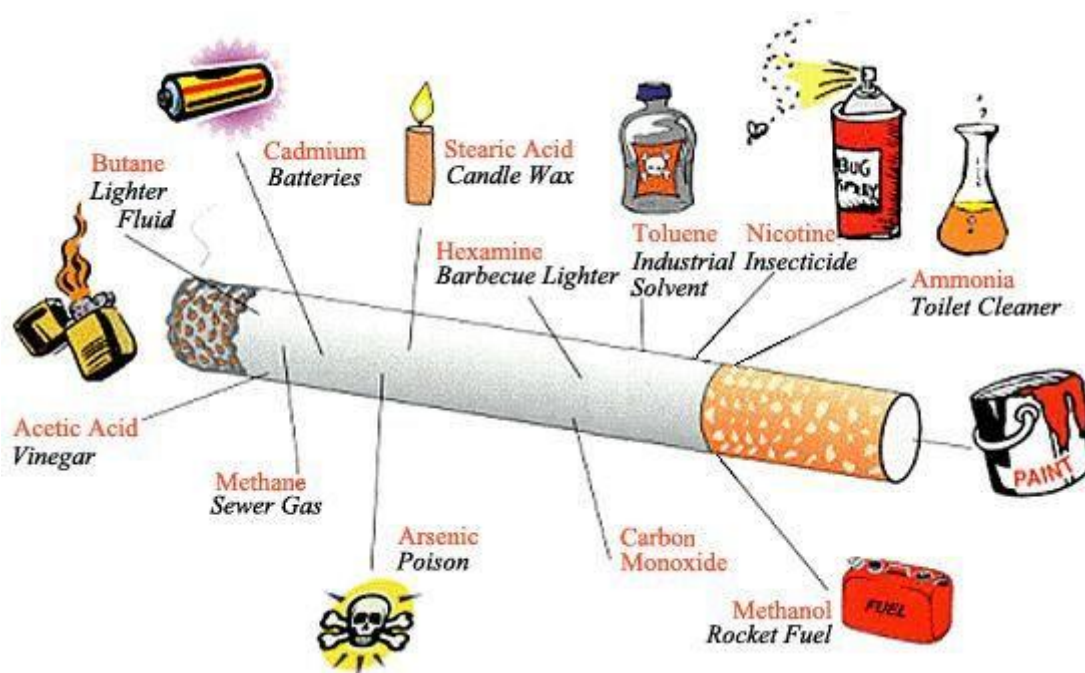


Figure 1.1 – Composition of tobacco smoke (source [6])

It should be noted that the main active ingredient of tobacco is nicotine. Its content in tobacco leaves usually ranges from 1 to 1.5%, but in some varieties it reaches 6-8%. One cigarette weighing 1 gram usually contains 10-15 mg of nicotine, and a cigar weighing 10 grams - up to 150 mg of this substance. In its pure form, nicotine is a transparent oily liquid with a burning taste. And a fairly large amount of it accumulates in the cigarette filter during smoking.

In fact, nicotine is as toxic as hydrocyanic acid. Nicotine is an extremely strong poison that acts mainly on the nervous system, digestion, as well as the respiratory and cardiovascular systems [7].

Systematic study of the effect of nicotine on a living organism has given scientists reason to assume a two-phase nature of reactions to its administration. First, there is increased irritability and excitability of various systems and organs, and then this state is replaced by depression.

Smoke inhaled by a smoker expels nicotine from tobacco leaves. It quickly dissolves in water, therefore it is easily absorbed through the mucous membranes of the mouth, nose, bronchi, and, getting into the stomach with saliva, through the walls of the gastrointestinal tract. Nicotine affects the transmission of impulses from the nerve to the muscle. Large doses of nicotine act similarly to the well-known poison - curare, which paralyzes the muscular system [8].

In order to better understand the impact of tobacco smoke on human life and health, as well as the environment, we consider it necessary to pay more detailed attention to the qualitative composition of tobacco smoke.

Tobacco smoke, as already noted, consists of carbon monoxide, hydrocyanic acid, acrolein, benzopyrene, nicotine, nitrosamine, hydrazine, vinyl chloride, toluidine, nicotine, nornicotine, nicotyrine, nicotine, nicotimine.

The main role among the pathological factors of smoking belongs to nicotine - an alkaloid without color and odor, which is part of the plants of the Solanaceae family, mainly tobacco. It is believed that the name nicotine was given by the surname of the French ambassador Jean Nicot (Nicot), who brought tobacco seeds and leaves from Portugal to France in the middle of the 16th century. Nicotine is one of the most dangerous poisons of plant origin. The primary targets of nicotine are nicotinic acetylcholine receptors (NARs), located in the ganglia of the sympathetic and parasympathetic nervous systems, skeletal muscles, and the central nervous system. Nicotine has a direct effect on NARs and an indirect effect on the functional activity of other receptors (dopaminergic and adrenergic): adrenaline is released from the adrenal gland, noradrenaline from the hypothalamus, dopamine from the

mesolimbic system; an increase in the level of catecholamines in the blood, which affects blood pressure, heart rate, and blood clotting factors; a variable increase in the secretion of acidic gastric juice, which causes the development of gastric ulcers, etc. [9].

Carbon monoxide (CO) occupies a special place among the substances present in tobacco smoke. It is a by-product of the combustion process and is found in tobacco smoke at high concentrations. The amount of carbon monoxide in the smoke of a single cigarette exceeds the nicotine content by 10–20 times. The primary toxic effect of CO lies in its high affinity for hemoglobin, which is approximately 20 times greater than that of oxygen [9].

Carbon monoxide, also known as carbon(II) oxide or carbon monoxide, is a colorless, highly toxic, odorless gas. It is formed as a result of incomplete combustion of fuel in automobile engines and heating devices operating on coal or other types of fossil fuels, including the combustion of tobacco. Carbon monoxide is almost insoluble in water and does not chemically interact with it [10].

Hydrocyanic acid (Latin *acidum hydrocyanicum*; from Greek *kyanos* - dark blue; synonyms: hydrogen cyanide, prussic acid), HCN, is a colorless liquid with a characteristic odor of bitter almonds; melting point 13.1 °C; boiling point 25.7 °C. It is a very weak acid and is displaced from its salts by phenol, boric acid, and carbon dioxide. Solutions of its salts exhibit an alkaline reaction and a characteristic odor. Hydrocyanic acid is miscible with water and many organic solvents in all proportions and, as a solvent, possesses a strong ionizing capacity. Mixtures of its vapor (6 - 40%) with air are explosive; in terms of explosive power, hydrogen cyanide exceeds trinitrotoluene (TNT). In air, its vapors have an ignition temperature of 538 °C [11].

What effect does the process of tobacco smoking have on the human body?

It is well established that nicotine produces serious systemic adverse effects in addition to its strong addictive potential. Nicotine negatively affects the cardiovascular system, reproductive system, lungs, kidneys, and other organs. Numerous studies consistently demonstrate its carcinogenic potential. Inhaled

nicotine reaches the arterial circulation of the brain through the lungs within approximately 7 seconds [12].

Nicotine binds to specific acetylcholine receptors-primarily $\alpha 4\beta 2$ nicotinic acetylcholine receptors-in the nucleus accumbens of the forebrain, the so-called reward center. This interaction stimulates the release of neurotransmitters such as dopamine and noradrenaline, which is perceived by tobacco users as a pleasurable effect [13].

When administered directly in humans, nicotine causes irritation and burning sensations in the mouth and throat, increased salivation, nausea, abdominal pain, vomiting, and diarrhea. Gastrointestinal effects are generally less severe but may occur even following dermal or respiratory exposure. The predominant immediate effects, as demonstrated in both animal and human studies, include an increase in heart rate and blood pressure. Nicotine also elevates plasma free fatty acid levels, induces hyperglycemia, and increases circulating catecholamine concentrations. Coronary blood flow is reduced, whereas blood flow to skeletal muscles is increased. An increased respiratory rate may lead to hypothermia, a hypercoagulable state, decreased skin temperature, and increased blood viscosity.

Nicotine is one of the most toxic poisons and has a rapid onset of action. In addition to its local effects, its primary target organs are the peripheral and central nervous systems. Severe poisoning is characterized by tremors, prostration, cyanosis, dyspnea, seizures, and progression to collapse and coma. Death may occur as a result of paralysis of the respiratory muscles and/or central respiratory failure. The estimated LD₅₀ in adults is approximately 30 - 60 mg of nicotine, whereas in children it is about 10 mg [12].

Moreover, nicotine is among the most powerful addictive substances, producing dependence comparable to that of cocaine or heroin. Nicotine interacts with nicotinic acetylcholine receptors and stimulates dopaminergic neurotransmission, thereby activating the reward center and contributing to mood elevation and apparent improvement in cognitive function. With chronic nicotine stimulation, GABAergic neurons become desensitized, losing their inhibitory

control over dopamine release. This mechanism enhances dependence by inducing craving. This effect has been shown to involve the CYP2A6 gene, contributing to hereditary susceptibility to nicotine dependence [14].

Effects of Tobacco Smoke on Major Human Body Systems

1) Respiratory system.

The effects of nicotine on the respiratory system are dual in nature: first, through its direct local impact on the lungs via smoking or inhalation, and second, through central nervous system–mediated mechanisms. Nicotine plays a significant role in the development of pulmonary emphysema in smokers by reducing elastin content in the lung parenchyma and increasing alveolar volume. It stimulates vagal reflexes and parasympathetic ganglia, leading to increased airway resistance and bronchoconstriction [15]. Nicotine also alters respiration through its effects on the central nervous system. The combined effects of bronchoconstriction and apnea increase tracheal tension and contribute to various respiratory disorders [14].

2) Cardiovascular system.

The acute hemodynamic effects of cigarette smoking or smokeless tobacco use are primarily mediated by sympathomimetic activity. Nicotine induces the release of catecholamines both locally and systemically, resulting in increased heart rate, arterial blood pressure, and myocardial contractility. It reduces blood flow in cutaneous and coronary vessels while enhancing circulation in skeletal muscles. Due to restricted oxygen delivery to the myocardium, cardiac workload is diminished [17]. Persistent nicotine stimulation may therefore contribute to the development of coronary vascular disease by inducing acute myocardial ischemia. In individuals with ischemic heart disease, myocardial dysfunction may be further aggravated. Nicotine alters the structural and functional properties of vascular smooth muscle and endothelial cells, enhances the release of basic fibroblast growth factor, and suppresses the production of transforming growth factor- β_1 . These effects increase DNA synthesis, mitogenic activity, endothelial proliferation, and atherosclerotic plaque formation. Nicotine-induced neovascularization may further promote plaque progression, leading to intimal thickening and atherogenic and ischemic changes,

thereby increasing the incidence of hypertension and cardiovascular disorders. Experimental studies in dogs have demonstrated the deleterious effects of nicotine on cardiac function [14, 18].

3) Oncological diseases.

Stimulation of nicotinic acetylcholine receptors (nAChRs) by nicotine exerts biological effects on cells involved in cancer initiation and progression. Nicotine activates intracellular signaling pathways through receptor-mediated mechanisms that promote the survival of damaged epithelial cells. In addition, nicotine serves as a precursor of tobacco-specific nitrosamines (TSNAs) through nitrosation processes in the oral cavity [14]. Smoking is a major cause of malignant neoplasms of the lips, oral cavity, pharynx, larynx, esophagus, trachea, bronchi, and lungs. According to statistical data from various countries, approximately 95% of individuals who died from lung cancer were heavy smokers, consuming 20 - 40 cigarettes per day, indicating that nearly all cases of lung cancer mortality are directly associated with smoking. Among patients with laryngeal cancer, smokers account for 80–90% of cases. The combined effect of smoking and alcohol consumption increases the risk of esophageal cancer by 9 - 15 times and gastric cancer by 9.5 times compared with non-smokers. A strong association has also been identified between smoking and bladder cancer, as well as breast cancer (approximately 20%) [19].

4) Renal system.

The risk of chronic kidney disease is significantly increased among smokers. Cigarette smoking has been shown to increase urinary albumin excretion, reduce glomerular filtration rate, increase the incidence of renal artery stenosis, and is associated with higher mortality in patients with end-stage renal disease. The pathogenesis of renal effects is largely mediated by nicotine through the induction of the cyclooxygenase-2 (COX-2) isoform, which promotes enhanced glomerular inflammation, acute glomerulonephritis, and ureteral obstruction. Smokers exhibit impaired renal responses to elevated systemic blood pressure, indicating a loss of renoprotective mechanisms. This loss further contributes to nicotine-induced renal pathology. In addition, a synergistic interaction between nicotine metabolism and

glucose metabolism exacerbates diabetes and may lead to accelerated cataract formation. The synergism between nicotine and glucose metabolism also increases the risk of diabetes mellitus [14].

1.2 Modern approaches to the prevention and treatment of tobacco addiction

First and foremost, it should be emphasized that tobacco smoking is a disease that poses a significant danger both to the individual who smokes and to those around them. A person who smokes is considered an active smoker, whereas people exposed to tobacco smoke in the surrounding environment are passive smokers.

Tobacco use is a leading cause of premature mortality and disability. Each year, more than 700,000 Europeans die from diseases related to tobacco smoking. It is well established that the average life expectancy of smokers is approximately 10 years shorter than that of non-smokers. Moreover, about half of all smokers lose up to 20 years of healthy life before dying from smoking-related diseases [20]. Approximately 50% of smokers die prematurely, resulting in an average loss of 14 years of life. In addition, smokers experience a higher burden of adverse health effects associated with tobacco use, including cardiovascular and respiratory diseases.

The European Union is actively working to reduce tobacco consumption through a range of measures, including regulation of tobacco products, restrictions on tobacco advertising, the creation of smoke-free environments, and the implementation of anti-smoking public health campaigns [21].

According to the most recent Global Adult Tobacco Survey (GATS), in 2017 approximately 8.2 million adults aged 15 years and older in Ukraine were current tobacco users. The prevalence of tobacco use among men was 39.7%, while among women it was 8.9%. The tobacco epidemic imposes a substantial burden, with about 85,000 people dying each year from tobacco-related diseases. In addition to loss of life, Ukraine incurs annual economic losses of approximately USD 12.5 billion due to tobacco use as a result of healthcare expenditures and population disability [22].

Tobacco dependence is a disease that develops in a significant proportion of adults who use tobacco. It is associated with long-term daily consumption of tobacco products, including cigarettes, pipes, cigars, waterpipes, bidis, chewing tobacco, and others. Most smokers are unable to quit smoking on their own. In medical terminology, chronic smoking is defined as tobacco dependence, nicotine dependence, or tobacco/nicotine addiction. Therefore, physicians and pharmaceutical professionals should recognize that tobacco dependence is a disease, rather than a habit, vice, pleasure, or lifestyle choice.

The primary etiological factor in the development of tobacco dependence is nicotine. Nicotine is a psychoactive substance that causes an exceptionally high level of addiction; it is present in tobacco and is responsible for dependence in individuals who chronically use tobacco products. Although smoking patterns may vary depending on the intensity and duration of use and the type of tobacco product consumed, the response of healthcare professionals to tobacco use should be unequivocal: tobacco dependence must be treated promptly and effectively.

Measures aimed at smoking cessation have a more pronounced medium-term impact on mortality and should therefore be actively promoted. As explained in the World Bank report “Curbing the Epidemic: Governments and the Economics of Tobacco Control” [23], if the initiation of tobacco use were reduced by 50% by 2020, the number of tobacco-related deaths would decline from 520 million to approximately 500 million by 2050. Conversely, if half of current smokers were to quit smoking by 2020, the number of deaths attributable to smoking would decrease from 520 million to 340 million by 2050 (Fig. 1.2).

Since tobacco addiction is a disease, it must be diagnosed and treated in the same way as other chronic diseases. A health care worker is obliged to intervene and initiate cessation of tobacco use. First of all, it is necessary to carry out educational work, which can include holding various campaigns, “health evenings”, placing posters, banners in public places, shops, pharmacies, hospitals, public transport, etc.

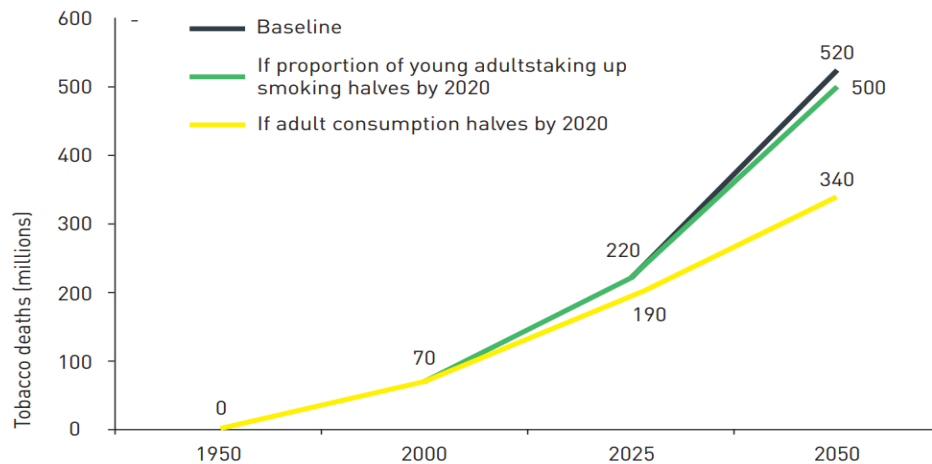


Figure 1.2 – Calculation of the number of deaths in 1950–2050 when applying different strategies (source [23])

In the modern world, medicine has achieved many breakthroughs in the field of studying various pathological conditions of the human body, including the treatment of tobacco addiction. Treatment of tobacco addiction is divided into drug treatment and non-drug treatment (psychological support, consultations).

Drug treatment is the process of eliminating and alleviating symptoms, restoring impaired processes and health with the help of drugs. It involves the use of drugs (drugs) selected by a doctor personally for each patient.

Drug treatment includes nicotine replacement therapy, taking antidepressants (if necessary), and sedatives.

Non-drug treatment is a wide range of methods that do not involve the use of drugs. Such methods include psychotherapy, cognitive-behavioral therapy, exercise, lifestyle changes, relaxation techniques, diet therapy, and others that motivate and support the patient in the act of quitting smoking, choosing another, distracting activity.

It should be understood that a smoker with any smoking experience, in most cases, experiences «nicotine withdrawal syndrome».

Withdrawal symptoms are caused by a sudden cessation of nicotine supply. Nicotine withdrawal can occur in the first 4 - 12 hours after quitting smoking. Symptoms include [23, 24, 25]:

- acute/uncontrollable urge to smoke (craving);
- irritability/aggression/anger;
- anxiety;
- agitation;
- fatigue;
- increased appetite;
- difficulty concentrating;
- depression;
- headache;
- waking up at night;
- mild dizziness/lightheadedness.

These symptoms vary from person to person: some smokers experience withdrawal more intensely than others. All of these symptoms are temporary, peaking in the first 24-72 hours and decreasing over the next 3-4 weeks. In approximately 40% of patients, symptoms may last longer than 3-4 weeks. Nicotine withdrawal symptoms represent the sum of all the changes caused by the abrupt cessation of nicotine use, which are particularly difficult to tolerate during the first 2-6 weeks and which should be accompanied by qualified medical care and psychological support. Thus, the best strategy, recommended by all smoking cessation guidelines for the treatment of nicotine dependence, is to combine pharmacological treatment with psychobehavioral therapy.

It should also be considered that long-term abstinence can be undermined by smoking cessation fatigue - the depletion of resources associated with smoking cessation/continuing to abstain [26].

Diagnosis of tobacco dependence may be performed in accordance with the World Health Organization (WHO) definition, whereby tobacco dependence is diagnosed when at least three of the following seven criteria have been present at any time during the preceding 12 months:

- a strong desire or craving to smoke;
- difficulty in controlling the amount of tobacco use;

- withdrawal symptoms when reducing or attempting to quit tobacco use;
- continued tobacco use despite clear evidence of harmful consequences;
- giving priority to smoking over other activities;
- high tolerance;
- physical symptoms of tobacco withdrawal.

In everyday clinical practice, nicotine/cigarette dependence is most commonly assessed using the Fagerström Test for Nicotine Dependence (FTND) (Fig. 1.3). This test includes not only yes/no responses but also a cumulative score that classifies tobacco users as having low, moderate, or high levels of nicotine dependence. The higher the score, the greater the individual's level of nicotine dependence.

| |
|---|
| 1. How soon after you wake up do you smoke the first cigarette? |
| Under 5 minutes [3] |
| 6-30 minutes [2] |
| 31-60 minutes [1] |
| More than 60 minutes [0] |
| 2. Does it feel difficult for you to abstain from smoking in places where smoking is banned (e.g. church, cinema, train, restaurant etc.)? |
| Yes [1] |
| No [0] |
| 3. Which cigarette would it be the most difficult for you to give up? |
| The first cigarette in the morning [1] |
| All the others [0] |
| 4. How many cigarettes/day do you smoke? |
| 10 or fewer [0] |
| 11-20 [1] |
| 21-30 [2] |
| 31 or more [3] |
| 5. Do you smoke more frequently in the first hours after you wake up than in the rest of the day? |
| Yes [1] |
| No [0] |
| 6. Do you smoke if you are so ill that you are immobilized in bed most of the day? |
| Yes [1] |
| No [0] |

The patient may fill in the questionnaire directly. The range of scores is from 0 to 10. This enables precise evaluation of nicotine dependence, based on which a therapy will be elaborated:

Score 0-3: no or low tobacco dependence
 Score 4-6: medium tobacco dependence
 Score 7-10: high tobacco dependence

Figure 1.3 – Algorithm of the Fagestrom Test for Nicotine Dependence (FTND) (source [23, 27])

The degree of nicotine dependence can be used as a guide for developing individualized treatment plans. The most informative items are the first and fourth questions: the number of cigarettes smoked per day and the time to the first cigarette after awakening in the morning. These questions may be asked by a physician during consultation and constitute a shortened version of the test, scored on a 0-6 scale, using the same scoring values as those assigned in the full 10-item FTND questionnaire.

When diagnosing tobacco dependence, it is essential to take into account the number of previous attempts to quit smoking. For this purpose, an analysis of prior quit attempts is conducted, which includes:

- the number of previous quit attempts;
- the longest period of smoking abstinence;
- any previous treatment for smoking cessation and its components;
- any history of withdrawal syndromes;
- any risk factors for relapse;
- positive aspects experienced during previous periods of abstinence.

Based on the collected and analysed data, clinicians draw conclusions and develop motivational strategies. Motivation may be assessed using direct questions, including:

- Do you want to quit smoking (at present)?
- If you decide to quit smoking, how confident are you that you will succeed?
- For what reasons do you want to quit smoking?
- How important is it for you to quit smoking?

According to the Transtheoretical Model (TTM) of Behaviour Change proposed by J.O. Prochaska and C.C. DiClemente, the psychological process of smoking cessation proceeds through five stages [23, 28, 29]:

- *Precontemplation stage*: the patient is fully satisfied with their smoking-related behaviour and perceives no need for change.
- *Contemplation stage*: the patient recognises the need for change, but this awareness is not yet strong enough to initiate specific actions or develop an action plan.
- *Preparation stage*: the patient has decided to attempt behavioural change related to smoking and is ready to do so in the near future.
- *Action stage*: the patient initiates an attempt to quit smoking.
- *Maintenance stage*: sustained abstinence for six months or longer.

To determine the severity of the disease, a thorough medical history (anamnesis) is obtained, which is particularly important when considering pharmacological treatment. Medical history is crucial for selecting an appropriate therapeutic approach due to potential drug interactions or contraindications associated with medications required for comorbid conditions. A history of acute cardiovascular events, epileptic seizures, renal disease, current or past substance dependence, and other conditions may necessitate caution when prescribing certain pharmacological treatments. Therefore, such information should be clearly documented in the smoker's medical records. In women, pregnancy and lactation may constitute contraindications to pharmacotherapy.

1.3 Global experience of the medical and pharmaceutical community in smoking cessation issues

As smoking is a chronic disease, it requires a therapeutic intervention with several components, among which pharmacotherapy is crucial. In different European countries, different European and national regulatory authorities are involved in the approval of drugs. There are two categories of drugs for smoking cessation: first-line and second-line. First-line drugs are effective in the treatment of tobacco dependence, have a higher level of safety and are approved by the European

Medicines Agency. They should be the first choice for any doctor in the treatment of nicotine dependence.

Three categories of medicinal products approved for the treatment of tobacco dependence are considered first-line therapies and include nicotine replacement therapy (NRT), varenicline, and bupropion. Second-line pharmacotherapies include cytisine, a partial nicotinic acetylcholine receptor agonist, which has been approved for this indication in several Eastern European countries. The tricyclic antidepressant nortriptyline and the antihypertensive agent clonidine are registered in many countries but are used less frequently as part of comprehensive smoking cessation interventions [30].

Second-line pharmacological agents recommended for smoking cessation comprise medications with proven efficacy, albeit to a lesser extent than first-line agents, either because they have not been approved by the European Medicines Agency (EMA) for the treatment of tobacco dependence or because they are associated with a higher incidence of adverse effects compared with first-line therapies. As a rule, these agents are recommended when first-line medications cannot be used for various reasons, such as lack of effectiveness, contraindications, or intolerance.

In recent years, substantial progress has been achieved in improving the effectiveness of pharmacological treatments for smoking cessation. In addition to monotherapy, various pharmacotherapeutic strategies may be employed to enhance cessation outcomes, including prolongation of treatment duration, dose adjustment to minimise adverse effects, and combination therapy using different pharmacological agents.

Today, smoking cessation treatment is integrated into most healthcare systems. However, it should be taken into account that the implementation of clinical guidelines must be carried out through engagement with services provided within primary and secondary healthcare, community pharmacies, local authorities, workplaces, and institutions responsible for the training of policymakers in the field of public health.

A systematic review of training interventions for healthcare professionals in the treatment of nicotine dependence, conducted by the Cochrane Collaboration, provided evidence that such training was associated with positive changes in clinical practice [31]. A clear illustrative example in this context is European practice (Fig. 1.4), which reflects the legal framework for coordinated action among all relevant stakeholders in addressing this problem [23].

According to the WHO framework, discussions related to assisting smokers in quitting should constitute a mandatory component of medical education curricula. Training of all categories of professionals working in this field should be conducted through the organisation of specialised training courses delivered by authorised experts in smoking cessation.

The target audience for smoking cessation training includes all counsellors and coordinators involved in smoking cessation services, namely physicians, nurses, midwives, pharmacists, dentists, psychologists, quitline counsellors, and other professionals who provide advice and support on quitting smoking.

The smoking cessation training standard encompasses two core domains: knowledge and skills. The content of the training programme must obligatorily include issues related to the tobacco epidemic in Europe, globally, and in Ukraine; factors initiating tobacco use; the pharmacological basis of tobacco dependence; health risks associated with tobacco use; other consequences of tobacco consumption (including, *inter alia*, environmental and economic impacts); approaches to tobacco control; the role of medical and pharmaceutical professionals in tobacco control; and tobacco control legislation [32].

With regard to the knowledge and skills to be acquired by learners, they are divided into two domains - cognitive and perceptual activity [23, 32]:

- *Cognitive domain*

B1: To know (to recall, consider, identify), i.e. knowledge of the prevalence of tobacco use, factors influencing its prevalence, and a list of health consequences of tobacco use affecting organs and body systems.

| | |
|--|--|
| Council of Europe | |
| Recommendation (1997) 5 | Protection of medical data |
| Safe Medication Practices (P-SPPH/SAFE) 2006 | Safe medication practices |
| Resolution ResAP (2003) 3 | Nutritional care in hospitals |
| Recommendation (2000) 5 | Patient participation |
| Recommendation Rec (2006)7 | Patient safety |
| WHO | |
| WHO-HEN-OBS 2009 | Physicians' skills |
| Standards for health promotion in hospitals 2004 | Health promotion |
| Checklist to reduce morbidity and mortality in a global population | Surgical safety |
| A performance assessment framework for hospitals: PATH | Performance indicators |
| EC directives | |
| Directive 2005/36/EC | Professional qualifications |
| Directive 1995/46/EC | Processing of personal data |
| Directive 2011/24/EU | Patients' rights in crossborder healthcare |
| EC research | |
| Development of pan – European standards and criteria for the inspection of (EU-Blood-Inspection) | Blood establishments |
| European quality system indicators and methodology on organ donation (ODEQUS project) | Organ donation |
| Antibiotic Resistance and Prescribing in European Children (APREC) | Antibiotic use |
| Developing Rational Use of Medicines in Europe (DRUM Europe) | Use of medicines |
| PROSAFE – Promoting patient safety and quality improvement in critical care | Critical care |
| Defining best practices in palliative care in Europe (PPP) | Palliative care |
| International Programme for Resource Use in Critical Care (IPOC) – a methodology and initial results of cost and provision in four European countries. | Critical care |
| Improving patient safety of hospital care through day surgery (DAYSAFE) | Day surgery |
| European Union (EU) Care and Management of Services for Older People in Europe Network (CARMEN) | Services for Older People |
| Best Practice in Access, Quality and Appropriateness of Health Services for Immigrants in Europe (EUGATE) | Minority populations |
| NGOs | |
| European Resuscitation Council guidelines 2010 | Resuscitation |
| Union Européene des Médecines Spécialistes (UEMS) | Quality of medical practice |
| UEMS Bastle Declaration | Continuing professional Developemnt |
| European charter of Patients' rights www.activecitizenship.net | Patients' rights |
| EACH Charter for children | Patients' rights |
| International Association of Gerontology: The Old Person's Charter of Standards | Patients' rights |
| European Society of Radiology (ESR). Risk management in radiology, 2004 | Radiology |
| European Hospital and Healthcare Federation (HOPE), October 2010 | Chronic diseases |
| CEN | |
| EN ISO 22870:2006 (POCT) – Rrequirements for quality and competence (ISO 22870:2006) | Chiropractic |
| EN 16224:2012 Healthcare provision by chiropractors | Point-of-care testing |
| WS0668001 Health care services – Quality criteria for health checks | Health checks |
| 00414001 Osteopathic healthcare provision | Osteopathy |
| CEN/TC 403 Aesthetic surgery services | Aesthetic surgery |
| ISO 9001 interpretation for health services | |
| National Standards Authority of Ireland: Health Services Application of ISO 9002 in a hospital environment | |
| SGS Yarsley International (SGS) in UK: BS EN ISO 9000: Guidance notes for its application to hospitals | |
| Swedish Standards Institute, Guide (CEN/TS 15224) | |
| DNV National Integrated Accreditation for Healthcare Organizations – Interpretive Guidelines | |
| CEN/TC 362 Healthcare services – Quality management systems | |

Figure 1.4 – European Standards of Health Practice (source [23])

B2: To understand, implement, analyse, and evaluate, i.e. knowledge of the biological and psychological mechanisms through which tobacco use affects health, as well as the ability to explain its environmental impact and economic burden.

B3: To apply the knowledge from B2 in practice (with patients) (history taking, assessment, and decision-making), i.e. to implement the 5A approach, offer assistance to smokers, and provide information on different treatment options.

- *Perceptual domain*

D1: Awareness, i.e. knowledge of tobacco industry marketing strategies.

D2: Attitudes, e.g. critical consideration of tobacco industry marketing practices and the importance of counteracting them.

D3: Behaviour, e.g. developing and implementing a plan to counteract tobacco industry marketing strategies.

Today, in accordance with the joint WHO-FIP resolution, this approach (multidisciplinary healthcare teams) is actively employed within healthcare systems in Europe and many other countries worldwide. Pharmacists are increasingly involved in tobacco control and smoking cessation programmes [2, 3]. A number of guidelines have been specifically developed to serve as a methodological framework for pharmacists.

SUMMARY

Comprehensive treatment of tobacco dependence involves both pharmacological and non-pharmacological approaches combined with the patient's full engagement in the therapeutic process. In addition, continuous support and maintenance of motivation to overcome dependence are essential during periods when attempts to quit may falter or be discontinued.

In this context, there is a clear need to understand the role of the pharmacist in this process and to obtain relevant professional information (including analysis of the product range, pricing policies, availability of medicines, and trends in the development of the pharmaceutical market) in order to effectively perform functions related to the provision of medical and pharmaceutical care to patients.

SECTION 2

RESEARCH DESIGN

In the context of contemporary challenges in medical science and practice, particular attention is drawn to the study of the pharmaceutical market within the segment of medicinal products used in the comprehensive treatment of tobacco dependence. A holistic analysis of the pharmaceutical market in this segment acquires strategic importance for meeting public health needs, while the quality of pharmaceutical care provided to such patients largely depends on the quality and completeness of information regarding the market environment of the relevant segment. Furthermore, it is essential to understand the health impacts of smoking, the approaches to addressing this problem, and the professional competence of the human resources involved.

Therefore, within the framework of the purpose of the planned research, tasks were formed that cover several blocks (Fig. 2.1).

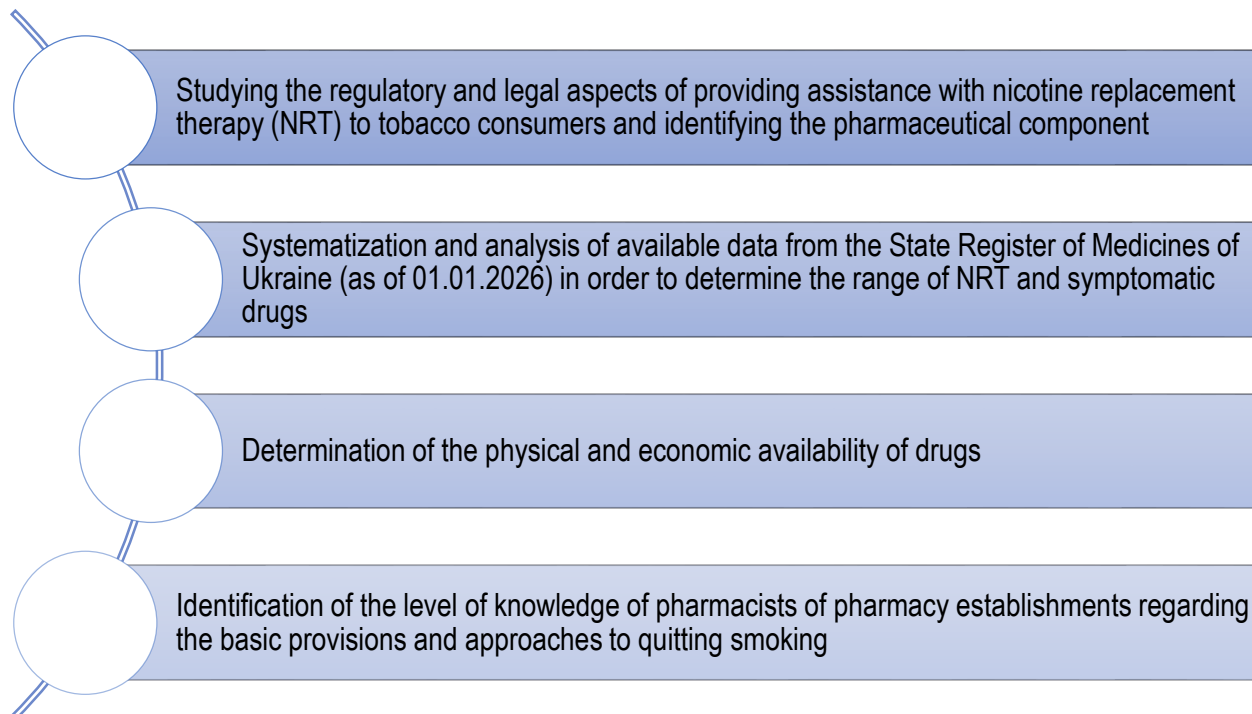


Figure 2.1 – List of research areas

(Source: author's development)

Expanding access to effective and safe medicinal products is an important component of improving patients' quality of life and reducing the risk of smoking-related complications. Thus, the findings of this study may contribute to the development of evidence-based public health decisions aimed at optimizing the role of pharmaceutical professionals within multidisciplinary teams addressing tobacco dependence.

To achieve the stated objectives and accomplish the research tasks, a comprehensive approach was employed, incorporating the use of various methodological tools.

In the course of analyzing price market conditions, the price liquidity coefficient (Kliq), the coefficient of affordability adequacy (Ka.s.), and the availability coefficient (Kd) were calculated [33].

The price liquidity coefficient is calculated using the following formula:

$$\mathbf{Kliq = P\ max - P\ min / P\ min,} \quad (2.1)$$

where: Kliq is the price liquidity coefficient;

P max is the maximum price;

P min is the minimum price.

The calculation of the solvency adequacy coefficient was carried out using the formula:

$$\mathbf{K\ a.s.=W/W\ a.s.,} \quad (2.2)$$

where: K a.s. – solvency adequacy coefficient;

W – average price of the drug for a certain period

W a.s. – average salary for a certain period (in Zaporizhia region as of September 2025 it was 18,000 UAH) [34, 35].

The availability coefficient for nicotine replacement therapy drugs was also calculated. Availability was calculated using the formula:

$$Kd. = | (ARP / S) - 1 |, \quad (2.3)$$

where ARP is the average retail price of the drug for a certain period, UAH;
S is the average salary for a certain period, UAH.

During the study, official data from the State Statistics Service of Ukraine (www.ukrstat.gov.ua) on the average monthly wage in the country for 2024–2025 (under wartime conditions) were used. When calculating expenditures on medicinal products, the maximum recommended course of therapy was applied.

The key research methods employed in the analysis of the selected segment of the Ukrainian pharmaceutical market are described below.

1. The State Register of Medicinal Products of Ukraine is an open-access source of information on all medicinal products registered in the country. Analysis of this register makes it possible to identify the complete range of medicinal products used in the relevant therapy that are available on the market, including information on manufacturers, dosage forms, strengths, and other characteristics.

2. The physical availability of medicinal products was assessed by analyzing their presence in pharmacies across different regions of Ukraine. Data were obtained from pharmacy chains, official pharmacy websites, and other publicly available sources. The assessment included an analysis of geographical distribution and the availability of medicinal products in various settlements.

3. Price market conditions and the economic affordability of medicinal products were evaluated based on an analysis of retail pharmacy prices, taking into account the average income level of the population. For this purpose, data from official statistical reports, pharmacy chains, and other relevant sources were used. This method made it possible to assess the impact of pricing policy on the accessibility of treatment for different population groups.

4. The level of awareness among pharmaceutical professionals working in pharmacies was examined using a questionnaire-based survey. For this stage of the study, we developed a special questionnaire (Appendix A). The survey was conducted online using Google Forms between December 2025 and January 2026.

SECTION 3

ANALYSIS OF THE UKRAINIAN PHARMACEUTICAL MARKET OF COMPREHENSIVE THERAPY FOR TOBACCO ADDICTION

3.1 Study of the assortment structure of the pharmaceutical market of anti-tobacco products

Systematic analysis of the market for nicotine addiction treatment was conducted on the basis of the unified anatomical-therapeutic and chemical classification system ATC (Anatomical Therapeutic Chemical). The analysis found that this segment of drugs is represented by drugs belonging to the anatomical group N07B A (drugs used in nicotine addiction). In turn, the group N07B A is divided into several therapeutic subgroups: N07B A01 «Nicotine», N07B A04 «Cytisine» (Fig. 3.1)

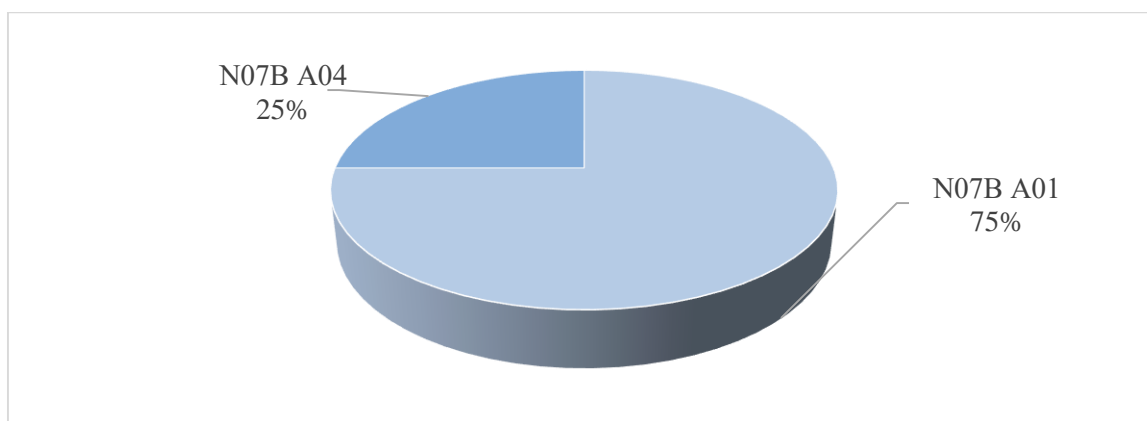


Figure 3.1 – Diagram of the distribution and filling of market segments of drugs used for nicotine addiction

A detailed systematic analysis of the indicated therapeutic subgroups is presented in Table 3.1. According to Table 3.1, the assortment is formed by monodrugs from two therapeutic subgroups.

When studying the segment of the pharmaceutical market of nicotine replacement drugs (NRDs) by the criterion of "order of dispensing from the pharmacy", it was determined that all groups of these drugs are dispensed without a

doctor's prescription (according to the medical annotation to the drug and information from the State Register of Medicinal Products of Ukraine).

Table 3.1. - Structural analysis of the pharmaceutical market segment for drugs used in the treatment of nicotine addiction (N07B A) as of October 2025

| Subgroup by ATC | International Nonproprietary Name | Trade name, registration period | Drug form, dosage, packaging |
|------------------------|--|---|---|
| 1 | 2 | 3 | 4 |
| N07B A01 «Nicotine» | Nicotine | NICORETTE® WINTER MINT, unlimited with 02.03.2017 | medicinal chewing gum 2 mg, 15 chewing gums in a blister; 2 blisters in a cardboard box |
| | | NICORETTE® WINTER MINT, unlimited with 02.03.2017 | medicinal chewing gum 4 mg, 15 chewing gums in a blister; 2 blisters in a cardboard box |
| | | NICORETTE® CROSS MINT, unlimited with 11.08.2020 | medicinal chewing gum 4 mg, 15 chewing gums in a blister; 2 blisters in a cardboard box |
| | | NICORETTE® CROSS MINT, unlimited with 11.08.2020 | 4 mg pressed lozenges; 20 lozenges in a flip-top pack |
| | | NICORETTE® FRESH MINT, unlimited with 08.02.2024 | oral spray, dosed, 1 mg/dose, 150 spray doses in a 15 ml PET bottle, a PET bottle with a mechanical sprayer and a safety valve is placed in a plastic polypropylene case, 1 or 2 plastic cases in a plastic contour container with a cardboard base |

Continuation of Table 3.1

| 1 | 2 | 3 | 4 |
|---------------------|----------|--|---|
| N07B A01 «Nicotine» | Nicotine | NICORETTE ® FRUIT-MINT, 02.12.2020-02.12.2025 | oral spray, dosed, 1 mg/dose; 150 spray doses in a 15 ml PET bottle. A PET bottle with a mechanical sprayer and a protective valve is placed in a polypropylene plastic case. 1 or 2 plastic cases in a plastic contour container with a cardboard base |
| | | NICORETTE ® WITH FRESH MINT FLAVOR, unlimited with 31.01.2017 | medicinal chewing gum 4 mg, 15 chewing gums in a blister; 2 blisters in a cardboard box |
| | | NICORETTE ® WITH FRESH MINT FLAVOR, unlimited with 31.01.2017 | medicinal chewing gum 2 mg, 15 chewing gums in a blister; 2 blisters in a cardboard box |
| | | NICORETTE ® WITH THE TASTE OF FRESH FRUIT, unlimited with 3 21.02.2017 | medicinal chewing gum 2 mg, 15 chewing gums in a blister; 2 blisters in a cardboard box |
| | | NICORETTE ® WITH THE TASTE OF FRESH FRUIT, unlimited with 3 21.02.2017 | medicinal chewing gum 4 mg, 15 chewing gums in a blister; 2 blisters in a cardboard box |
| N07B A04 | Cytisine | CICOTIN ®IC, 13.12.2023- 13.12.2028 | film-coated tablets, 1.5 mg; 20 tablets in a blister; 5 blisters in a pack |
| | | TABEX ®, unlimited with 21.03.2019 | film-coated tablets, 1.5 mg, 20 tablets in a blister; 5 blisters in a cardboard box |

The next step in the study was to study the assortment by type of dosage form (Fig. 3.2). The leading positions are occupied by solid dosage forms such as chewing gums and tablets. Aerosols took second place.

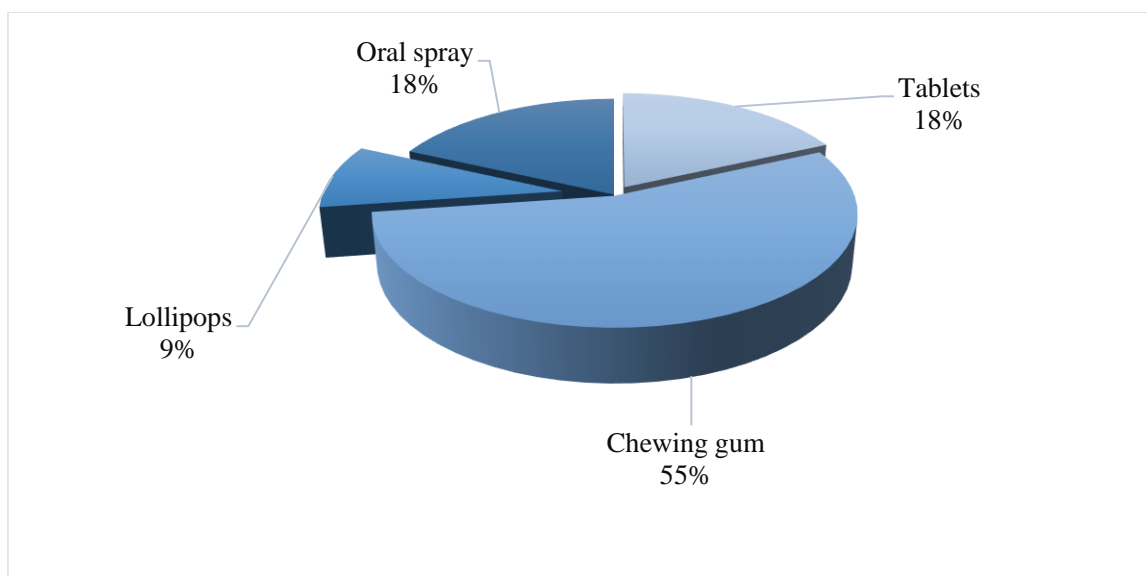


Figure 3.2 - Diagram of the distribution of pharmaceutical products by dosage form

Further, an analysis of the assortment was carried out according to the criterion «original / generic» remedy. It was determined that original drugs have a significant advantage, the relative share of which is 99%, and generics only 1%.

Thus, a study of the assortment of nicotine replacement therapy drugs showed that the greatest diversity in terms of name and number of offers belongs to subgroup N07B A01 «Nicotine», the smallest - N07B A04 «Cytisynyclin», which determines a promising direction for the further development of new dosage forms for this segment.

3.2 Research on the corporate structure of the Ukrainian market of products used in the prevention and treatment of tobacco addiction

During the marketing research, the corporate structure of the Ukrainian pharmaceutical market of nicotine replacement therapy was analyzed and the leaders among the manufacturers were identified. This segment is saturated with products from several different countries (Table 3.2 and Figure 3.3). Unfortunately, the entire range is represented by 100% foreign products.

Table 3.2 - Company structure of the pharmaceutical market for tobacco addiction treatment

| № | Manufacturer | Country of manufacture | Name of the drug, form of release |
|----------|---------------------|-------------------------------|---|
| 1 | INTERCHEM | Ukraine | CICOTIN®IC, pills |
| 2 | Sopharma | Bulgaria | TABEX®, pills |
| 3 | McNeil AB | Sweden | NICORETTE ® FRESH MINT, Oral spray 1mg |
| | | | NICORETTE ® WINTER MINT, chewing gum 2mg |
| | | | NICORETTE ® WINTER MINT, chewing gum 4 mg |
| | | | NICORETTE ® WITH FRESH MINT FLAVOR, medicinal chewing gum, 4 mg |
| | | | NICORETTE ® WITH FRESH MINT FLAVOR, medicinal chewing gum, 2 mg |
| | | | NICORETTE ® WITH THE TASTE OF FRESH FRUIT, 4 mg medicinal chewing gum |
| | | | NICORETTE ® WITH THE TASTE OF FRESH FRUIT, 2 mg medicinal chewing gum |
| | | | NICORETTE ® ICE MINT, pressed lollipops, 4 mg |
| | | | NICORETTE ® ICE MINT, pressed lollipops, 2 mg |
| | | | NICORETTE ® FRUIT-MINT, oral spray, dosed 1 mg/dose |

It was determined that among the three manufacturing companies from different countries, the leading position belongs to the Swedish company McNeil AB, which supplies 11 drugs to the Ukrainian market. The last place was shared by Bulgaria and Ukraine, which supply 1 drug each, respectively.

Thus, an analysis of the range of drugs for the treatment of nicotine addiction has been conducted. In recent years, scientific research has been actively conducted on the treatment of this disease due to the large number of patients.

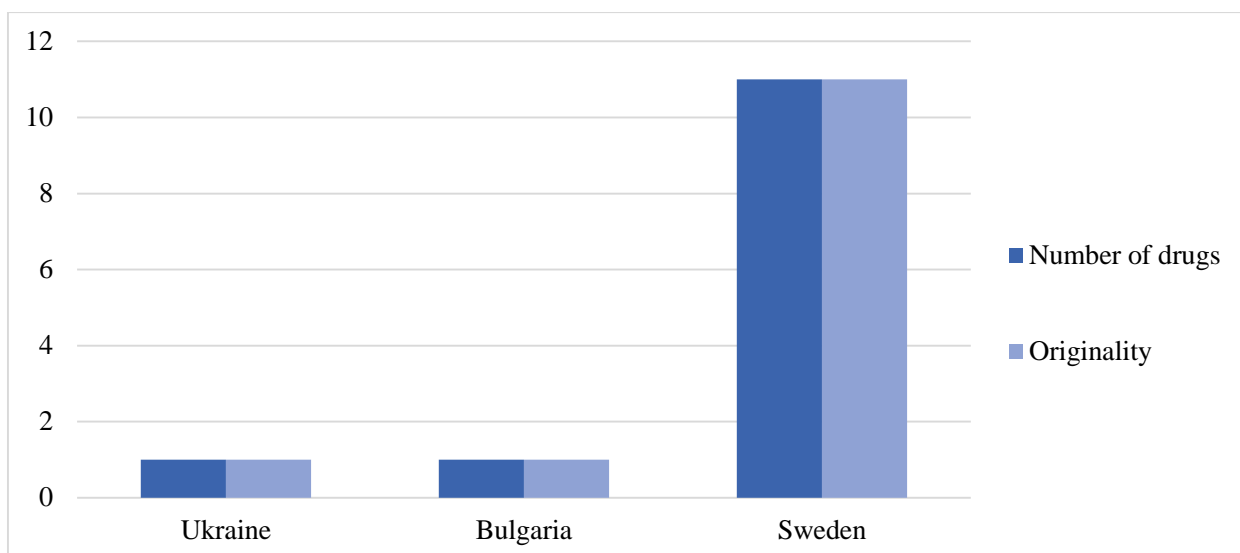


Figure 3.3 - Diagram of distribution of nicotine replacement therapy drugs by originality by country

Therefore, there is a need to develop new effective nicotine replacement drugs of Ukrainian production. It is advisable to further develop new drugs for the treatment of nicotine addiction.

3.3 Analysis of the socio-economic affordability of anti-tobacco products

To determine the physical availability of the drugs of the studied group for Ukrainian consumers, we analyzed the availability of registered nicotine replacement drugs in pharmacies of the largest cities of all regions of Ukraine: the Southern region was represented by pharmacies in Zaporizhzhia, Mykolaiv, and Odessa; the Eastern region - pharmacies in Dnipro and Kharkiv; the Central region - Kyiv; the Northern region - Chernihiv and Sumy; the Western region - Lviv, Ivano-Frankivsk, and Ternopil. The results of the analysis of information on physical availability by regions of Ukraine as of January 2026 are presented in Table 3.3.

As can be seen from the data in Table 3.1, nicotine replacement and anti-tobacco drugs in the form of oral sprays, tablets, chewing gums, and lozenges are available throughout Ukraine (data for the territory temporarily occupied by russian

troops are absent). That is, we can say that Ukrainian consumers are provided with 100% of drugs to combat smoking.

Table 3.3 - Physical availability of registered nicotine replacement products by regions of Ukraine

| № | Drug name | Southern region | | | Eastern region | | Central region | Northern region | | Western region | | |
|---|---|-----------------|----------|--------------|----------------|---------|----------------|-----------------|------|----------------|-----------------|----------|
| | | Odessa | Mykolaiv | Zaporizhzhia | Dnipro | Kharkiv | Kyiv | Chernihiv | Sumy | Lviv | Ivano-Frankivsk | Ternopil |
| 1 | CICOTIN®IC, tablets | + | + | + | + | + | + | + | + | + | + | + |
| 2 | TABEX®, tablets | + | + | + | + | + | + | + | + | + | + | + |
| 3 | NICORETTE® FRUIT-MINT, oral spray | + | + | + | + | + | + | + | + | + | + | + |
| 4 | NICORETTE® CRYSTAL MINT, pressed lozenges 2 mg | + | + | + | + | + | + | + | + | + | + | + |
| 5 | NICORETTE® CRYSTAL MINT, pressed lozenges 4 mg | + | + | + | + | + | + | + | + | + | + | + |
| 6 | NICORETTE® WINTER MINT, chewing gum 2 mg | + | + | + | + | + | + | + | + | + | + | + |
| 7 | NICORETTE® FRESH FRUIT FLAVOR, medicinal chewing gum 4 mg | + | + | + | + | + | + | + | + | + | + | + |
| 8 | NICORETTE® FRUIT-MINT, oral spray | + | + | + | + | + | + | + | + | + | + | + |

The next step of our research was the analysis of the price situation of the pharmaceutical market of nicotine replacement drugs. For a detailed analysis of the price situation, the price liquidity coefficient (Klig), the solvency adequacy

coefficient (Ka.s.) and the availability coefficient (Kd) are most often calculated. Therefore, we calculated the indicated coefficients for all market positions of nicotine replacement drugs available in pharmacies (tab. 3.4 and 3.5)

Table 3.4 - Wholesale prices and liquidity ratio of nicotine replacement therapy drugs

| № п/п | Торгова назва препарату, форма випуску | Оптова ціна Min, грн | Оптова ціна Max, грн | Klig |
|----------|--|-------------------------|-------------------------|------|
| 1 | CICOTIN®IC, tablets | 340.00 | 485.60 | 0,42 |
| 2 | TABEX®, tablets | 410.80 | 512.70 | 0,24 |
| 3 | NICORETTE® FRUIT-MINT, oral spray | 325.70 | 350.20 | 0,07 |
| 4 | NICORETTE® CRYSTAL MINT, pressed lozenges 2 mg | 225.90 | 272.40 | 0,20 |
| 5 | NICORETTE® CRYSTAL MINT, pressed lozenges 4 mg | 245.40 | 265.00 | 0,07 |
| 6 | NICORETTE® WINTER MINT, chewing gum 2 mg | 250.00 | 280.70 | 0,12 |
| 7 | NICORETTE® FRESH FRUIT FLAVOR, medicinal chewing gum 4 mg | 280.00 | 400.50 | 0,43 |
| 8 | NICORETTE® FRUIT-MINT, oral spray | 300.20 | 325.40 | 0,08 |

According to the data presented in Table 3.4, price competition can be observed in the Ukrainian pharmaceutical market for four nicotine replacement therapy (NRT) medicines, since the optimal liquidity ratio should not exceed 0.15 (a higher value is considered inappropriate). These medicines include NICORETTE® FRUIT & MINT Mouth Spray, 1 mg per dose; NICORETTE® ICE MINT Lozenges, 4 mg; NICORETTE® WINTER MINT Chewing Gum, 2 mg; and NICORETTE® FRUIT & MINT Mouth Spray, 1 mg per dose.

The affordability ratio (Ka.s) presented in Table 3.5 reflects the level of demand for medicines and characterizes consumers' purchasing power. The lower the value of this indicator, the higher the affordability of the medicine. Therefore, the most affordable product, both physically and economically, is NICORETTE®

WINTER MINT Chewing Gum, 2 mg (0.017), whereas the least affordable is CYTOTIN IS (0.029), as shown in Table 3.5.

Table 3.5 - Indicators of solvency and availability ratios of nicotine replacement therapy drugs

| № | Trade name, form of release | Retail price min., UAH | Retail price max., UAH | Weighted average retail price, UAH | Ka. S. | Kd. |
|---|---|------------------------|------------------------|------------------------------------|--------|------|
| 1 | CICOTIN®IC, tablets | 436.80 | 650.30 | 512.00 | 0,029 | 0,97 |
| 2 | TABEX®, tablets | 336.30 | 468.40 | 400.20 | 0,022 | 0,98 |
| 3 | NICORETTE® FRUIT-MINT, oral spray | 450.60 | 740.50 | 560.50 | 0,022 | 0,98 |
| 4 | NICORETTE® CRYSTAL MINT, pressed lozenges 2 mg | 430.70 | 700.10 | 600.10 | 0,034 | 0,96 |
| 5 | NICORETTE® CRYSTAL MINT, pressed lozenges 4 mg | 340.20 | 410.10 | 370.40 | 0,021 | 0,98 |
| 6 | NICORETTE® WINTER MINT, chewing gum 2 mg | 286.50 | 425.20 | 310.70 | 0,017 | 0,98 |
| 7 | NICORETTE® FRESH FRUIT FLAVOR, medicinal chewing gum 4 mg | 314.20 | 440.30 | 390.10 | 0,022 | 0,98 |
| 8 | NICORETTE® FRUIT-MINT, oral spray | 410.90 | 591.80 | 480.90 | 0,027 | 0,97 |

The affordability of the specified nicotine replacement therapy medicines is also confirmed by the calculated Kd indicator, as there is an inversely proportional relationship between the affordability ratio (Ka.s) and the price accessibility coefficient.

Conclusion to Section 3.

Thus, as of March 2026, nicotine replacement therapy medicines and other smoking cessation drugs are available in pharmacies and their structural subdivisions and are physically accessible to all population groups. Every Ukrainian consumer has the opportunity to choose both the manufacturer and the pharmacy institution in Ukraine according to their pricing policy.

SECTION 4

RESEARCH ON THE ROLE AND PLACE OF THE PHARMACIST IN TOBACCO CESSATION

To fulfill one of the tasks set, we developed a special questionnaire to determine the opinion of practicing pharmaceutical workers (Appendix A). 257 respondents participated in the survey, the general socio-demographic characteristics of which are presented in Table 4.1.

Table 4.1 – Characteristics of respondents

| Characteristic | Share, % | Characteristic | Share, % |
|--------------------------------|----------|-------------------------------|----------|
| <i>Age</i> | | <i>Gender</i> | |
| Up to 25 years | 5,4 | female gender | 94,2 |
| From 26 to 35 years | 22,2 | male gender | 5,8 |
| From 36 to 45 years | 37,4 | | |
| From 46 to 55 years | 24,9 | <i>Work experience</i> | |
| Over 55 years | 13,2 | Less than 1 year | 1,9 |
| <i>Position</i> | | 1-5 years | 10,9 |
| Pharmacy manager | 44,6 | 6-10 years | 13,2 |
| Pharmacist | 27,3 | 11-20 years | 37,0 |
| Pharmacist assistant | 24,1 | More than 20 years | 37,0 |
| Other (student, curator, etc.) | 4,0 | | |

As we can see, the majority of respondents are women aged 36-45, with higher pharmaceutical education and more than 10 years of work experience.

During the processing of the questionnaires, it was found that a significant part of the respondents has limited awareness of national programs to combat tobacco smoking (Fig. 4.1 a). However, awareness of the WHO Framework Convention is slightly higher and amounts to 32% (Fig. 4.1 b). This indicates the need to strengthen the information of pharmacists about preventive measures in the fight against tobacco smoking.

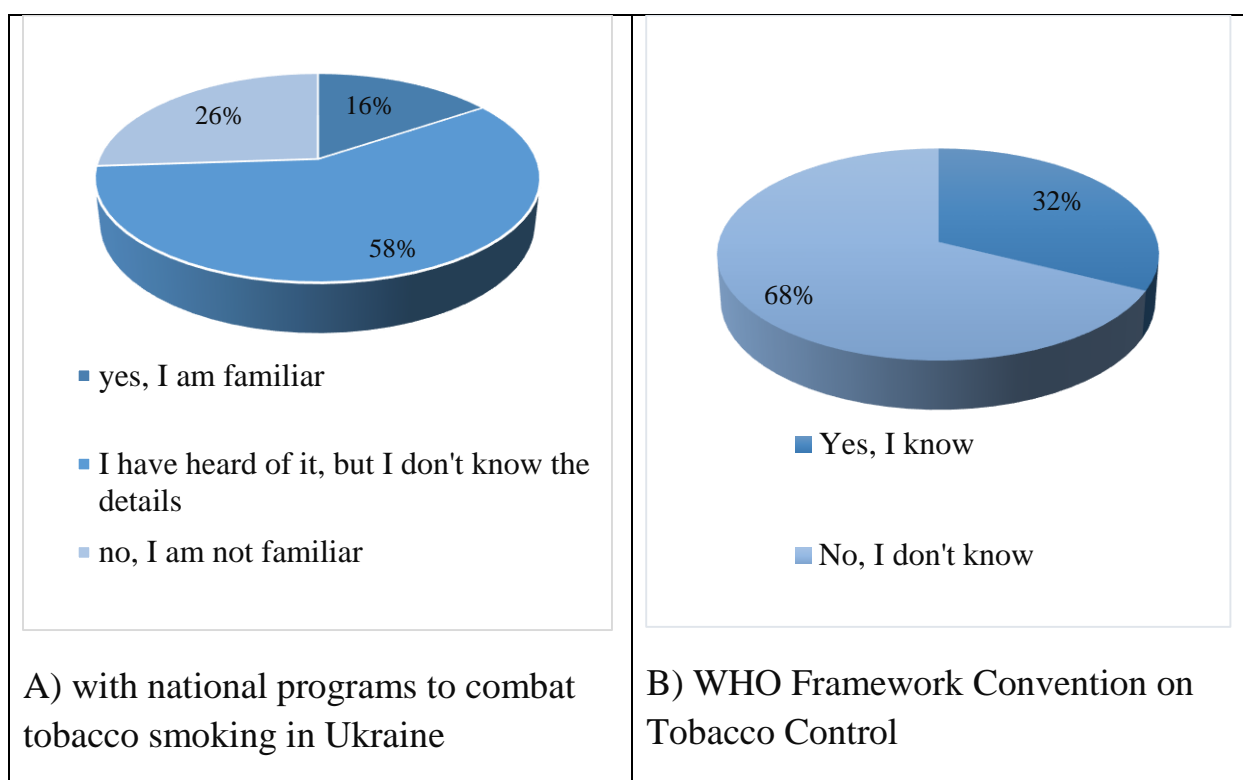


Figure 4.1 – Distribution diagram of respondents’ responses regarding awareness of A) national programs B) WHO Framework Convention on Tobacco Control

Regarding the responses to the question, “Have you undergone any specialized training or courses on smoking prevention and patient counseling?”, the findings indicate that only 3.5% had received training in smoking prevention. However, a significant proportion expressed a desire to gain additional knowledge (80.9% of respondents), while 15.6% did not consider such training necessary, which may indicate an underestimation of the role of pharmacists in tobacco control.

The next block of questions made it possible to determine respondents’ views on the role and place of pharmacists in smoking prevention and tobacco control. Thus, 44.4% of respondents supported an active role for pharmacists in these activities. However, a considerable share (42.4%) considered this to fall primarily within physicians’ competence (Fig. 4.2).

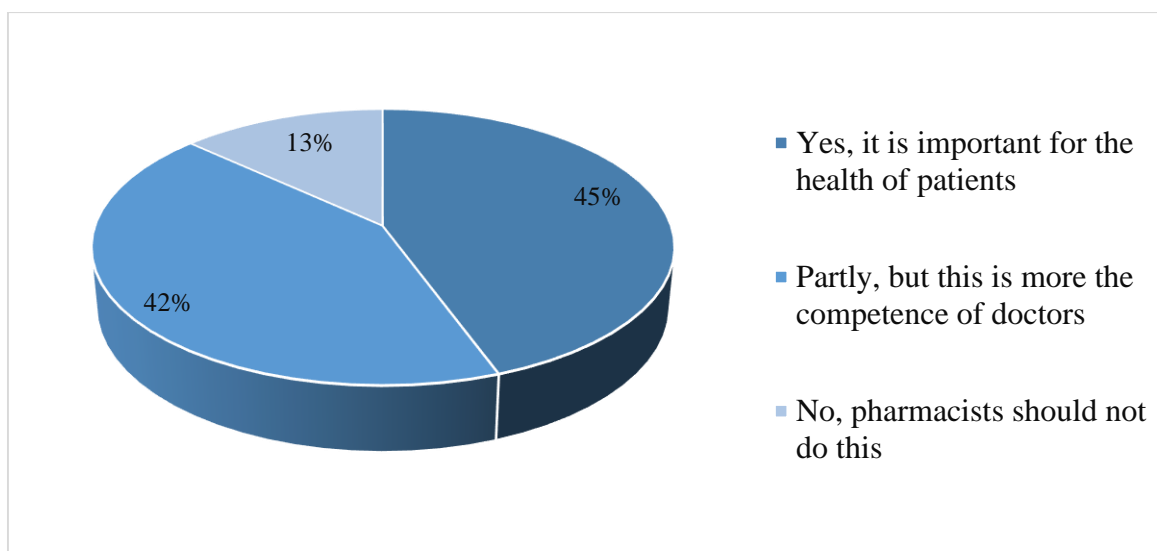


Figure 4.2 – Distribution diagram of respondents’ answers to the question “Do you think that pharmacists should take an active part in the fight against tobacco smoking?”

The data indicate a need to strengthen awareness among all surveyed groups regarding contemporary multidisciplinary approaches to the management of various chronic diseases and the role of pharmacists, including their involvement in smoking prevention and tobacco control.

With regard to effective smoking cessation methods, 58% of students consider nicotine replacement therapy (NRT) to be the most effective, 18% favor abrupt smoking cessation, and 6.5% support the use of herbal infusions. Concerning the recommendations that students would provide on cessation methods (Fig. 4.3), in comparison with those offered by practicing pharmacists, NRT remains the most effective and most frequently recommended approach. Psychological support is also widely endorsed, whereas electronic cigarettes are rarely recommended.

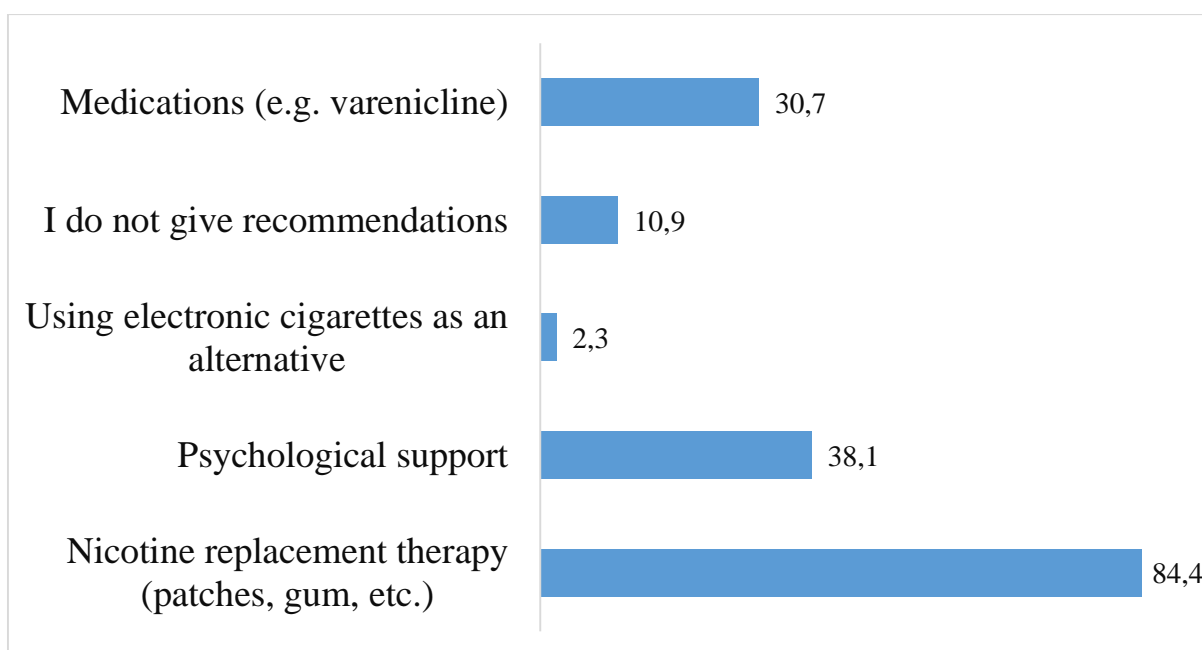


Figure 4.3 – Distribution diagram of pharmacists’ responses to the question “What methods of combating smoking do you recommend (would you recommend) to patients?”

As for whether pharmaceutical care is available to Ukrainian patients today, we found that 58.4% of surveyed pharmacists (Fig. 4.4) claim that there is a limited range of drugs for nicotine replacement therapy.

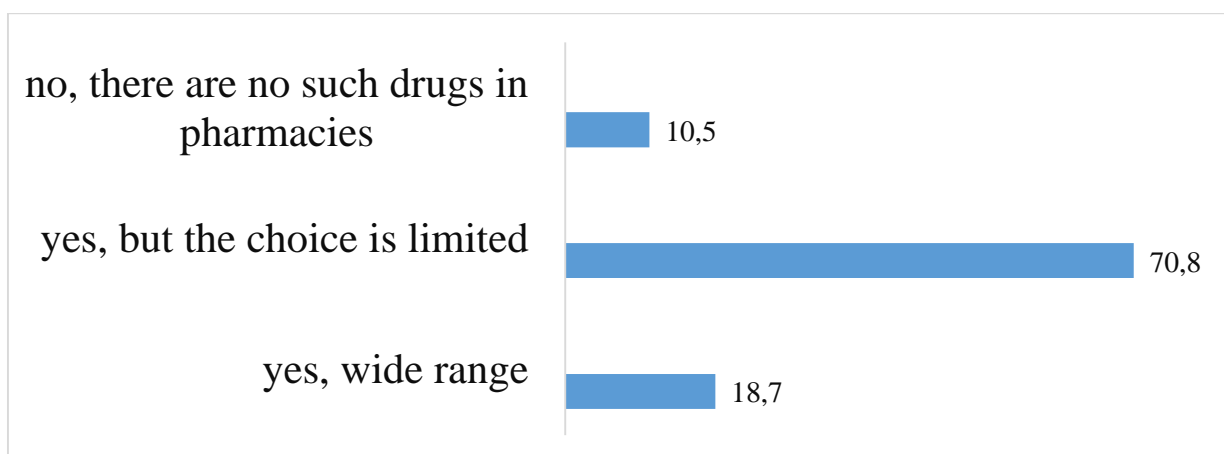


Figure 4.4 – Distribution diagram of responses of surveyed pharmacists to the question “Do you think the pharmacy has nicotine replacement therapy drugs in stock?”

We also have a very similar picture of the respondents' answers to the question "What factors, in your opinion, complicate patients' access to smoking cessation aids?" (Fig. 4.5).

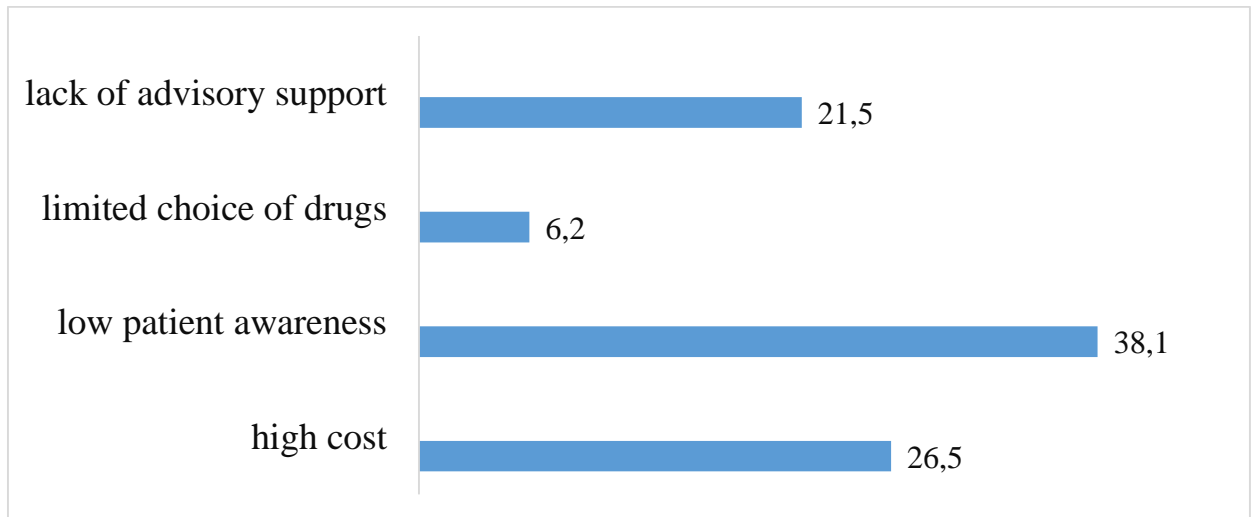


Figure 4.5 – Distribution diagram of pharmacists' responses to the question "What factors do you think make it difficult for patients to access smoking cessation aids?"

All respondents consider the high cost of therapy and low patient awareness of it to be the most important factors. Some comments from the respondents were:

- lack of desire in patients to quit smoking;
- alcohol consumption;
- electronic cigarette advertising;
- easy availability of cigarettes;
- lack of willpower and search for excuses for their inability to change their lifestyle.

In addition, the majority of respondents consider nicotine replacement therapy to be partially effective (Figure 4.6).

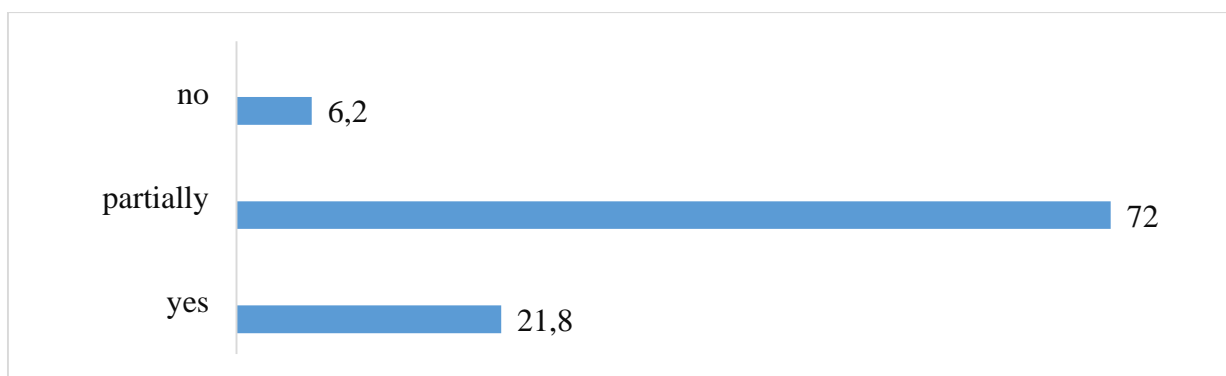


Figure 4.6 – Distribution diagram of pharmacists’ responses to the question “Do you believe that nicotine replacement therapy is an effective means of quitting smoking?”

The final block of the questionnaire made it possible to determine pharmacists’ views regarding their awareness of international experience in involving pharmaceutical professionals in smoking prevention and tobacco control programs within multidisciplinary healthcare teams.

Respondents were asked the following questions: “Do you have experience familiarizing yourself with international tobacco control programs?” and “In your opinion, which tobacco control measures should be implemented in Ukraine (select up to three options)?” (Figs. 4.7 and 4.8, respectively).

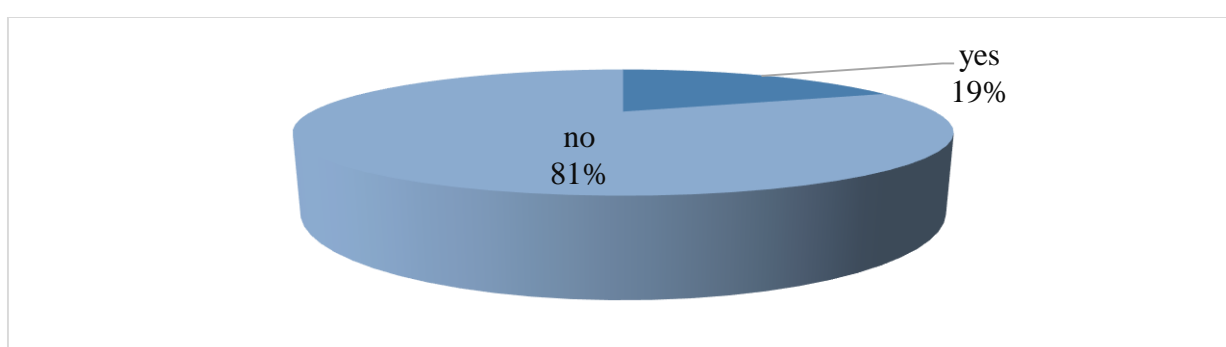


Figure 4.7 – Distribution diagram of pharmaceutical workers’ responses to the question “Do you have experience of familiarizing yourself with international tobacco control programs?”

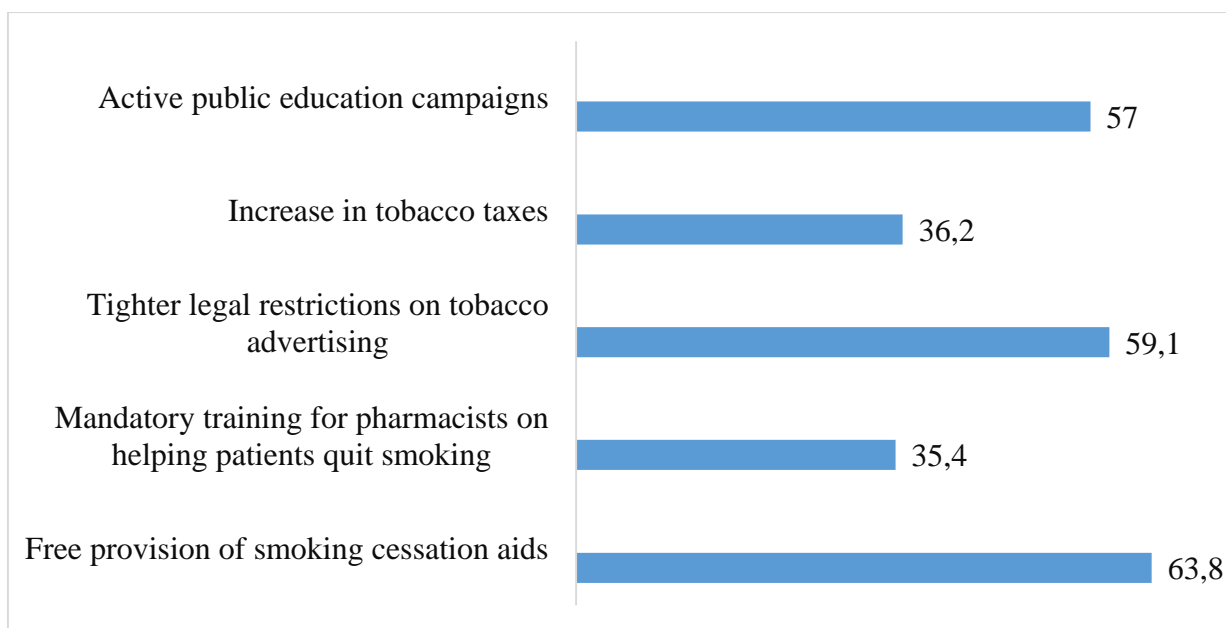


Figure 4.8 – Distribution diagram of responses of surveyed pharmaceutical workers to the question “What measures to combat tobacco smoking, in your opinion, should be implemented in Ukraine?”

Regarding the measures that should be implemented in Ukrainian pharmaceutical practice, our findings indicate that pharmacists show limited support for initiatives involving mandatory training on assisting patients with smoking cessation (35%). At the same time, there was near consensus in favor of the “free provision of smoking cessation products” (63.8%). Practicing pharmacists actively support economic measures (free products, taxation policies), educational interventions, and professional training for pharmacists.

Thus, Ukrainian pharmaceutical professionals currently possess basic knowledge about the consequences of tobacco use and smoking cessation methods; however, their awareness of national and international programs remains limited. Practicing pharmacists consider NRT to be the most popular and recommended method of smoking cessation. Nevertheless, its accessibility is constrained by high cost, low public awareness, and a limited product assortment.

With regard to the role of pharmacists in tobacco control, a debate is evident: approximately 40% support active involvement, while many respondents regard this as primarily within physicians’ competence.

Based on the conducted survey, the following recommendations can be proposed:

- to introduce mandatory modules on tobacco prevention into educational curricula and to organize training programs for pharmacists on patient counseling and the use of nicotine replacement therapy;
- to develop informational materials for pharmacies (brochures, posters);
- to strengthen public educational campaigns and ensure the affordability of nicotine replacement therapy through subsidies or free provision.

CONCLUSIONS

Based on the conducted research, the following general conclusions were drawn:

1. Based on the findings of both foreign and domestic scholars, it has been established that a comprehensive approach to the treatment of tobacco dependence involves a combination of pharmacological and non-pharmacological methods, together with the active participation of the patient in the therapeutic process. Continuous support and motivation for individuals who have previously attempted to quit smoking are also essential. In this context, there is an increasing need for a clear understanding of the pharmacist's role in this process. Pharmacists should be provided with professional information regarding the range of smoking cessation products, their cost, accessibility, and general trends in the pharmaceutical market in order to effectively perform their medical and pharmaceutical functions in patient care.

2. The assortment structure of the pharmaceutical market for tobacco dependence treatment in Ukraine indicates the dominance of original NRT medicines belonging to the subgroup N07BA01 "Nicotine." These medicines are mainly presented in the form of chewing gums, lozenges, and sprays. At the same time, generic products account for only 1% of the market, which reduces the economic accessibility of these medicines for the general population and creates prospects for the development of Ukrainian equivalents and the expansion of dosage forms.

3. The pharmaceutical market of nicotine replacement therapy medicines is characterized by limited domestic production, as 100% of the products available are of foreign origin. Only two active substances (nicotine and cytisine) are registered in Ukraine and are used within two main therapeutic subgroups. A Swedish company holds the leading position in terms of the number of trade names, indicating monopolization within this market segment. This situation highlights the need to support local manufacturers and diversify the market.

4. The study of the socio-economic accessibility of nicotine replacement therapy products demonstrated a high level of physical availability across the regions of Ukraine; however, economic barriers persist, particularly the high cost of medicines. According to the calculated liquidity and accessibility coefficients, only a portion of the products can be considered truly affordable for the broader population.

5. The results of the survey of practicing pharmacists indicate the presence of basic knowledge regarding smoking prevention; however, the level of awareness of national and international programs remains low. Nicotine replacement therapy is recognized as the most effective method of smoking cessation, yet its use is limited by low public awareness, insufficient availability of pharmaceutical products in pharmacies, and the lack of systematic support from pharmacists. There is a need to implement educational, motivational, and economic measures to enhance pharmacists' involvement in multidisciplinary tobacco control efforts.

6. There is an ongoing debate regarding the role of pharmacists in tobacco control: while some respondents support their active involvement, many consider this primarily a physician's competence. Pharmacists actively support initiatives aimed at mandatory training on assisting patients with smoking cessation: most respondents are open to further education and propose the implementation of educational, informational, and economic initiatives to increase the effectiveness of anti-smoking interventions.

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ADDITION

Dear Pharmacist,

This questionnaire is aimed at studying the status of implementation of tobacco control measures in pharmaceutical practice in Ukraine. Your opinion is extremely important for analyzing the effectiveness of existing initiatives and the possible implementation of international experience.

The questionnaire is anonymous, and the collected data will be used exclusively for scientific and statistical purposes. Please mark the answer that best corresponds to your opinion.

With care for YOU!

THE CONFIDENTIALITY OF YOUR ANSWERS IS GUARANTEED!

Your age

Experience in the pharmaceutical health sector

Your position

Gender

Section 2. Level of awareness of tobacco control measures

Are you familiar with national tobacco control programs in Ukraine?

Are you aware of the WHO Framework Convention on Tobacco Control?

Have you received any special training or courses on tobacco prevention and patient counseling?

Section 3. The role of pharmacists in tobacco prevention and control

Do you believe that pharmacists should take an active role in tobacco control?

How often do you counsel patients/drug users on smoking cessation methods?

What methods of tobacco control do you recommend to patients? (multiple options are possible)

Section 4. Availability and effectiveness of pharmaceutical care

Does your pharmacy stock nicotine replacement products?

What factors do you think make it difficult for patients to access smoking cessation aids?

Do you believe that nicotine replacement therapy is an effective means of smoking cessation?

Section 5. Implementation of international experience

Do you have experience in familiarizing yourself with international tobacco control programs?

What tobacco control measures do you think should be implemented in Ukraine?

Are you willing to undergo additional training on tobacco control methods?

Section 6. Additional comments

Do you have any suggestions for improving the work of pharmacists in tobacco control?

Thank you for your time and participation in the study!

Your answers will help improve preventive measures and implement effective tobacco control strategies in pharmaceutical practice in Ukraine. ❤️🙏

MASTER'S THESIS

defended « _____ » _____ 2026 with a grade of _____

Chairman of the Examination Board,

Head of the Department of Pharmaceutical,

Organic and Bioorganic Chemistry of the ZDMFU,

Doctor of Pharm. Sciences, Professor, _____ Lyudmila KUCHERENKO