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**MASTER'S THESIS**

on the topic « Research on the Ukrainian market of antimicrobial agents for the  
treatment of infectious skin diseases»

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## ANNOTATION

The qualification (master's) thesis is devoted to certain aspects of pharmaceutical provision of the population of Ukraine suffering from pyoderma.

The literature review conducted a systematic analysis of information sources on epidemiological indicators of skin diseases in Ukraine. Data on the etiology, pathogenesis and treatment of dermatoses (pyoderma) and existing vectors of pharmaceutical research in the field of dermatology were structured.

The experimental part of the work presents the results of research on the pharmaceutical market of antimicrobial drugs offered for the local treatment of pyoderma, its modern assortment structure and the main manufacturers of pharmaceutical products. The physical and socio-economic accessibility of these drugs for Ukrainian patients was determined.

Based on the conducted marketing research, the result of the work was the development of recommendations for improving the management of the range of local antibacterial drugs; attention was focused on the need to ensure the appropriate level of physical and economic accessibility, educational work.

The master's thesis comprises 53 pages of typewritten text and includes an introduction, a literature review, two main sections, general conclusions, a list of references. The work is illustrated with 5 tables, 8 figures, and 3 formulas. The list of references contains 37 sources.

*Keywords:* topical antibacterial drugs, pyoderma, pharmaceutical market, pharmaceutical care.

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**LIST OF CONVENTIONAL ABBREVIATIONS**

LAD	– local antibacterial drugs
TN	– trade name
PhC	– pharmaceutical care
PhM	– pharmaceutical market

## INTRODUCTION

Infectious skin diseases are a serious medical and pharmaceutical problem, the solution of which depends on the level of scientific achievements in dermatology, pharmaceutical production, as well as on the proper use of these achievements during the provision of medical and pharmaceutical care (PhC).

Pyoderma attracts the greatest attention of specialists among skin diseases. According to statistics, pyoderma affects all groups of the population, including workers in various industries and children, which indicates the social significance of dermatoses.

Treatment of pyoderma includes the use of systemic and local antibacterial drugs. Local antibacterial drugs (LAD), such as ointments, creams, gels, sprays, powders, have a number of advantages over systemic antibiotics, especially in pediatric practice. The cornerstone for dermatologists also remains the rapid growth of antibiotic-resistant forms of microorganisms, which requires the search and development of new drugs for external use.

Taking into account the above, **the goal** of the qualification (master's) thesis was a comprehensive study of the LAD market with the subsequent formation of recommendations for improving the management of the LAD assortment and improving the quality of pharmaceutical care for pyoderma.

To achieve the set goal, it was necessary to solve the following **tasks**:

- to analyze in detail the literary sources on the issues of epidemiology, etiology, diagnostics and approaches to the treatment of dermatoses;
- to analyze pharmaceutical research by domestic scientists related to the solution of dermatological issues, including the management of the LAD assortment for infectious skin diseases;
- to investigate the regulatory and legal framework for the provision of medical and pharmaceutical care for dermatoses;
- to analyze the physical and economic accessibility of LAD C for the treatment of pyoderma;

- to analyze potentially possible areas of LAD assortment management and develop recommendations for improving the provision of pharmaceutical care for infectious skin diseases.

**The object** of the study is medical and pharmaceutical care for infectious inflammatory skin diseases.

**The subject** of the study is a segment of the Ukrainian pharmaceutical market of local antibacterial drugs used for the treatment of pyoderma.

**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 results of the study can be used to find new vectors of research related to the development of highly effective LADs for the treatment of pyoderma; development of marketing strategies for LAD manufacturers and distributors; increasing the knowledge of doctors and patients about the features of the use of LADs for the treatment of pyoderma.

**Personal contribution of the master's student.** Together with the scientific supervisor, the goal and objectives of the study were determined, systematic and methodological approaches were developed, according to which methods were selected for the practical part of the master's thesis. The master's student personally conducted an analytical review of the literature on the topic of the work, as well as market research, analysis of physical accessibility, statistical processing and analysis of the results obtained, their presentation in the form of tables, graphs and diagrams. The author took part in the analysis and generalization of the data obtained.

**Scope and structure of the work.** The master's thesis comprises 53 pages of typewritten text and includes an introduction, a literature review, two main sections, general conclusions, a list of references. The work is illustrated with 5 tables, 8 figures, and 3 formulas. The list of references contains 37 sources.

**SECTION 1**  
**CURRENT CLINICAL AND EPIDEMIOLOGY FEATURES OF SKIN**  
**DISEASES IN UKRAINE**  
**(Literature Review)**

**1.1. Analysis of the epidemiological situation of inflammatory skin diseases**

Skin diseases occupy a special place among the aesthetic problems of the population, which determines the volume of both cosmetic, medical and pharmaceutical assistance (PhA) to the population. The prevalence of inflammatory skin diseases in Ukraine has its own characteristics and nature [1, 2].

According to the results of the analysis of scientific works of scientists, it was found that both adults and children suffer from skin inflammation [1, 2]. Moreover, skin inflammation in different age and gender groups has its own characteristics, which is associated with the anatomy and physiology of the skin. Since each period of a person's life is distinguished by certain anatomical and physiological features, the clinic, course and treatment of skin inflammation will have their own differences, respectively. Scientists also focus on the consequences of such skin diseases - psycho-emotional disorders [3, 4, 5].

According to the ICD-10 (International Classification of Diseases, 10th revision), skin diseases include a large group of diseases that include conditions affecting the epidermis, its appendages (hair, hair follicle, sebaceous glands, apocrine sweat glands, eccrine sweat glands, and nails) and the corresponding mucous membranes (conjunctiva, oral cavity, and genitals), dermis, skin, vascular network, and subcutaneous tissue (subcutis) [6].

In general, doctors classify the following skin diseases:

- diseases of the epidermis;
- diseases of the dermis;
- diseases of the appendages of the epidermis (hair, hair follicle, sebaceous glands, apocrine sweat glands, eccrine sweat glands and nails);

- diseases of the subcutaneous tissue;
- diseases of the vascular system of the skin.

The following skin diseases are divided into a separate group:

- Malignant neoplasms of the skin;
- Hematoma of surgical wound of the skin (NE81.00);
- Superficial infection of the incision site (NE81.20);
- Neonatal phototherapeutic burn (KC50);
- Symptoms or signs related to the skin (ME60-ME6Y).

Scientists also give another classification of skin diseases by etiology, which is often found in textbooks and scientific works [7, 8]:

- infectious: caused by bacteria, fungi, viruses or parasites;
- inflammatory: caused by a hyperactive immune reaction or allergy;
- genetic: caused by inherited traits or mutations.

However, despite the significant diversity of skin diseases, a review of the literature allowed us to identify certain pathologies, the prevalence of which concerns Ukrainian doctors: benign and malignant skin tumors, acne and infectious skin diseases, including epidermophytosis, skin tuberculosis and pyoderma.

Oncopathology is one of the important medical problems of healthcare, which causes a high risk of mortality and reduces the quality of life [9]. Different types of cancer in different countries of the world have their own characteristics, and Ukraine is no exception, where the share of benign and malignant skin neoplasms together is 48% (first-time diagnosis) and 37% (repeated patient visits) of all detected skin diseases [2, 5, 9].

A study of morbidity rates in Ukraine for the period 2000–2019 showed an increase in the incidence of cancer among the population by 10.6%, i.e. 359.4 per 100 thousand [9]. Scientists also established the heterogeneity of the cancer incidence rate depending on the region (the highest rate is Kirovohrad region (475.5 per 100 thousand) and gender (men have a 5% higher incidence rate than women) [9].

Medical scientists note that this increase in the number of patients is primarily associated with lifestyle, occupational hazards, medical activity, and medical awareness [8, 9]. A detailed analysis of skin cancer incidence by year is presented in Fig. 1.1.

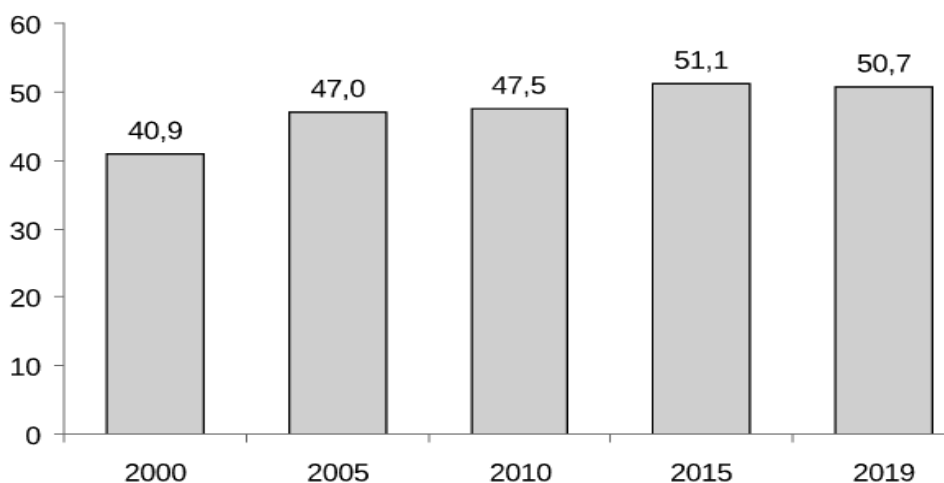


Figure 1.1 – Incidence of skin cancer in the population of Ukraine during 2000–2019 (per 100 thousand of the corresponding population) [9]

Benign skin neoplasms have a different structure and prevalence, with which patients most often consult a dermatologist (Table 1.1) [2].

Another problem for modern dermatologists is infectious skin diseases. In economically developed countries, the incidence of skin infections is up to 35-40% of total dermatological pathology, and in less economically developed regions - 60% [11]. As noted above, these include pustular diseases (pyodermas), tuberculosis, leprosy, anthrax, gangrene, etc.

Despite the seriousness of such skin diseases as leprosy, anthrax, etc., a significant burden of prevalence is borne by skin tuberculosis and pustular lesions.

Skin tuberculosis is often called an «old-new» infection, which is explained by significant variations in new manifestations of the disease caused by the tubercle bacillus.

Table 1.1 – Structure and prevalence of benign skin neoplasms in Ukraine

Nosological forms	2001-2003		2004-2006		2007-2009	
	absolutely число	(%)	absolutely число	(%)	absolutely число	(%)
Common, flat and plantar warts	42	8,1	45	8,1	58	9,8
Condyloma acuminatum	20	3,8	25	4,5	28	4,7
Soft fibromas	25	4,8	27	4,8	27	4,5
Dermatofibromas	24	4,6	21	3,8	27	4,5
Seborrheic keratosis	51	9,8	47	8,4	46	7,7
Acquired dermal and combined melanocytic nevi	37	7,1	39	7,0	53	8,9
Congenital melanocytic nevus	18	3,4	19	3,4	28	4,7

According to scientists, there is very little information about the spread of skin tuberculosis and all of it is extremely contradictory [10]. According to statistics, the average incidence of skin tuberculosis is 0.43 people per 100 thousand population [12]. Doctors note that this figure is 4-5 times lower than that of tuberculosis of classically familiar localizations, which may be due to poor diagnostics and low level of education of citizens.

Another infectious disease that causes significant physical and moral suffering to both children and adults, according to scientists, remains pyoderma.

Pyoderma is a very relevant problem of modern dermatology. Almost a third of all skin diseases are types of pyoderma [5, 8]. Pyoderma can be an independent disease or a complication of another disease (sweating, scabies, eczema). Pyoderma is especially dangerous for infants and people with reduced immunity, which makes the issue of high-quality diagnostics, prevention and treatment urgent [13]. According to WHO, 111 million children in the world are affected by pyoderma [14].

Unfortunately, detailed statistical information on the prevalence and incidence in Ukraine is not kept, despite the threatening consequences of this disease.

## **1.2 Etiology, pathogenesis and features of treatment of pyoderma**

Pyoderma, as noted above, occupies one of the first places in the structure of dermatological pathology. According to WHO, 30% of patients with pyoderma temporarily lose their ability to work, up to 1% of patients become disabled [15, 16], less often they die. Therefore, the issue of diagnosis, treatment and prevention of pyoderma is one of the most urgent tasks of medicine and pharmacy.

*Pyoderma* (from the Greek *pyon* – pus, *derma* – skin) – a group of purulent-inflammatory skin diseases caused by pyococci.

Medical scientists believe that the etiological causative agents of pyoderma are pathogenic and conditionally pathogenic microorganisms [5, 14]:

- staphylococci;
- streptococci;
- *Pseudomonas aeruginosa*;
- *Escherichia coli*;
- *Proteus vulgaris*;
- *Corynebacteria*, etc.

Additional concomitant factors of development may be the entry of pyococci onto the skin from the external environment (exogenous infection) and the activation of microbial autoflora located on the surface of the skin, especially in folds, and on mucous membranes.

Pyoderma is classified into:

- Primary (as independent diseases);
- Secondary (as complications of dermatoses accompanied by itching and damage to the integrity of the skin (scabies, dermatitis, eczema, neurodermatitis, etc.).
- Acute;
- Chronic.

Scientists believe that the main reason for the chronicity of pyoderma and the long-term persistence of the pathogen in the body is the production by bacteria (especially gram-negative) of substances that inactivate immunity factors (lysozyme, complement, immunoglobulins, as well as phagocytosis).

A detailed classification of pyoderma by pathogens and localization is presented in Table 1.2.

Table 1.2 – Classification of pyoderma by pathogens and localization

	<b>Staphylo</b> derma	<b>Strepto</b> derma	<b>Mixed</b>
<b>Superficial</b>	1.Ostiofolliculitis 2. Folliculitis 3.Common (vulgar) sycosis 4. Vulgar acne	Streptococcal impetigo (contagious): <ul style="list-style-type: none"> <li>- bullous;</li> <li>- annular;</li> <li>- slit-like (jaundice);</li> <li>- syphilitic;</li> <li>- periungual panaritium</li> </ul>	1.Common (vulgar) impetigo 2.Epidemic vesicoureteral infection of infants

<b>Deep</b>	1. Furuncle 2. Furunculosis 3. Carbuncle 4. Hydradenitis 5. Indurative, conglobate acne	Ecthyma: - vulgar - gangrenous - - penetrating (drilling)	1. Chronic ulcerative-vegetative pyoderma 2. Chancriform pyoderma
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We will describe each of the pyodermas separately, to understand the main aspects of medical and pharmaceutical care.

***Superficial staphyloiderma [5, 9, 14]***

Causative agents: staphylococci.

Predisposing factors: minor injuries, skin contamination, overheating. Infection from patients is possible, this occurs more often among children.

*Ostiofolliculitis* – pustule → erosion, crust → secondary spot, which disappears over time. The course without treatment is several weeks. The rash does not leave scars.

Folliculitis is a purulent inflammation of the hair follicle. Initially, an inflammatory, red nodule with a pustule at the top forms around the hair, which collapses, forming a crust; the nodule resolves, the crust falls off, leaving no scars. A furuncle can form from folliculitis.

*Streptococcal impetigo* (contagious impetigo) - on hyperemic skin - phlyctenation → erosions → thin grayish crusts → temporary erythema, peeling. The foci are prone to peripheral growth, autoinoculation → affect large areas, most often the face, limbs.

*Ordinary ecthyma* - a deep pustule forms on the skin on an inflammatory red infiltrated base; it collapses, the infiltrate partially disintegrates, an ulcer is formed, often covered with a crust, when healing leaves a scar.

*Furuncle* is an acute purulent-necrotic inflammation of the hair follicle, sebaceous gland and subcutaneous tissue caused by staphylococcus. Initially, a painful red nodule appears, which increases, a pustule with a hair in the center forms at the top. Over time, the pustule collapses, the nodule in the center disintegrates

with the formation of a purulent core, which gradually separates, forming an ulcer, after healing of which a scar remains.

*Acute furunculosis* - when the patient has many furuncles; chronic furunculosis - when some furuncles heal, but new ones appear over a long period of time (months).

*Carbuncle* - several furuncles on an inflamed, dense, painful base; on the surface, several pustules that disintegrate with the formation of purulent cores, when separated, pus flows out. After healing, a scar remains. Furuncles, carbuncles are especially dangerous when localized on the face - inflammation of the meninges (meningitis) is possible. Possible complications: lymphangitis, lymphadenitis, thrombophlebitis and others.

*Hydradenitis* - purulent inflammation of the apocrine sweat gland (under the armpits, around the nipples, navel, in the genital area, anus). Inflamed painful node or conglomerates of nodes → fistulas → scars. Body temperature may increase with a violation of the general condition

### ***Chronic atypical pyodermas [5, 9, 14]***

*Chronic deep ulcerative-vegetative pyoderma*. Pathogens staphylococci, streptococci, proteus, intestinal and pseudomonas aeruginosa. Pustules form on the skin → bluish-red plaques of soft consistency → ulcers → papillomatous growths with bloody-purulent discharge → serpiginous growth → uneven scars with "bridges".

*Gangrenous pyoderma*. The etiology is unknown, it is believed that allergic vasculitis is the basis, microorganisms play a sensitizing role.

In 70-80% of cases it is combined with ulcerative colitis, Crohn's disease, leukemia, lymphomas. Nodular furuncle-like elements → decay → ulcers with round or polycyclic outlines; the bottom is uneven with granulations, the edges are uneven, indented, with a bluish tint → serpiginous growth → scars. The course is chronic, recurrent. Differentiated with deep mycoses, colliquative tuberculosis of the skin, iodo- and bromoderma, chronic ulcerative-vegetative pyoderma.

*Chancriform pyoderma* is localized on the genitals, lips, etc. Subjective sensations are absent. Pustule → rounded ulcer (1-2 cm) with a dense base → hemorrhagic crust; the bottom is even with raised edges, minor discharge → superficial scar. Regional lymph nodes are dense, painless, not connected. The course is 2-3 weeks. Differentiated with hard chancre (repeated negative results of seroreactions and for pale treponema).

Treatment of pyoderma is a complex and multi-level process, in which antibacterial agents, both local and systemic, are used first of all [5, 9, 13].

1. External treatment. In the form of monotherapy, it is indicated in the treatment of superficial pyoderma.

- 1-2% alcohol solutions of aniline dyes (gentian violet, methylene blue, brilliant green)
- in the affected area, cut off the hair (in no case shave or depilate) and wipe healthy skin with 1-2% camphor or salicylic alcohol
- irrigation with 1% chlorophyllipt solution, Microcid, ectericide solutions.
- ointments with antibiotics (erythromycin, tetracycline, gentamicin), wound healing drugs (Levomekol ointment, methyluracil, Pantestin), sulfonamides (5% streptocide liniment), when wet - aerosols (lifuzol, oxycyclozol, levovinisol)
- for deep pyoderma in the stage of infiltrate formation, ichthyol cakes, 10% ichthyol ointment, balsamic liniment according to Vishnevsky are used.

2. Systemic therapy is indicated for the treatment of deep and chronic pyoderma, with ineffectiveness of external therapy.

- antibiotics (penicillin, tetracycline groups, macrolides, cephalosporins, especially 1-2 generations, fluoroquinolones 2-3 generations, aminoglycosides)
- sulfonamides (biseptol, bactrim)
- specific and nonspecific immunotherapy
- vitamins and trace elements
- if necessary, resorbable drugs, vascular agents, reparants

- physiotherapy: irradiation with short-wave rays after rejection of the necrotic core, paraffin application and phonophoresis of lidase during scar formation.

The following can be called pyoderma prevention: strengthening the body, observing the rules of skin hygiene, treating microtraumas with disinfectants (alcoholic iodine solution, iodideserin, chloramphenicol alcohol, etc.).

### **1.3 Analysis of directions of Ukrainian pharmaceutical research on the provision of pharmaceutical care for skin diseases (pyoderma)**

Today, pharmacy is one of the leading sectors of the economy for each country and its development is strategic in nature (providing its own population with high-quality, affordable, effective medicines).

The main directions of pharmacy development today include increasing the availability of medicines (economic and physical), expanding the role of the pharmacist, an adequate response of the industry to growing consumer expectations (quality of healthcare technologies, innovation), and enhanced development of the scientific component of the industry [17, 18].

The Ukrainian pharmaceutical industry should not be left aside (development of new, innovative, improved medicines, medical devices, etc.) for each of the nosologies presented in the ICD-10, including for the treatment of pyoderma. Their prevalence and the accompanying burden for both the individual and society as a whole remains a large-scale problem.

According to the results of a review of scientific publications by Ukrainian scientists on the problems of treatment and prevention of skin diseases, it was found that most of them are devoted to the analysis of the assortment, market conditions, and services in the cosmetology niche [19, 20]. Unfortunately, as stated in the previous section, cosmetology products cannot solve such serious problems as pyoderma, so research into the market of LAD for the treatment of pyoderma remains relevant.

A separate group of studies has been allocated to the works of scientists on the development of new technologies and drug formulations for the treatment of various skin diseases [21-23].

Separately, the works of scientists who were directly involved in the development of new drugs for pyoderma were analyzed. Thus, in the work of Homeniuk V. D. [24] a new herbal preparation was proposed that would have a synergistic effect on the etiologic and pathogenetic factors of pyoderma. Gubar S. M. [25] proposed a drug containing triclosan and allantoin (antibacterial and emollient components), and also proposed methods for quality control of new drugs.

Marchenko M. V. [26] experimentally established the concentrations of excipients necessary to preserve the activity of staphylococcal bacteriophage in drugs; critical process parameters for obtaining drugs of proper quality; choice of packaging. Thus, pharmaceutical research on drugs for pyoderma is fragmented, which distorts the real situation of providing medical and pharmaceutical care to patients with pyoderma in Ukraine.

## **SUMMARY**

Today, both in Ukraine and in the world, the incidence of pyoderma remains consistently high. The consequence of untimely detection and poor-quality treatment of pyoderma can be severe chronic forms of skin diseases, disability and even death. The research data are being updated in the context of military events taking place in Ukraine.

Therefore, timely response, comprehensive phased treatment of skin diseases with antibacterial, antifungal, anti-inflammatory and other drugs of local and systemic action remains important for the health care system.

Along with this, pharmacy must meet the modern needs of the health care system, which requires scientists to comprehensively analyze and review the current situation on the pharmaceutical market of drugs, especially antimicrobial drugs used in pyoderma.

Therefore, the following are considered relevant and appropriate:

- analysis of the range of antibacterial drugs used in pyoderma;
- study of the regulatory and legal organization of the provision of medical and pharmaceutical care for pyoderma;
- analysis of the physical and economic accessibility of LAD;
- development of recommendations for improving the management of the range of antibacterial drugs used for pyoderma and improving pharmaceutical care

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.

## SECTION 2

### RESEARCH DESIGN

As noted earlier, the object of the study was medical and pharmaceutical care for infectious inflammatory skin diseases.

And the subject of the study was the segment of the Ukrainian pharmaceutical market of local antibacterial drugs used for the treatment of pyoderma.

Materials and methods of the study. The scientific basis of the study was the achievements of domestic and foreign scientists in the treatment of pyoderma, price lists of Internet resources for searching for medicines, regulatory and legislative documents:

- regulatory and directive documents of the Ministry of Health of Ukraine, WHO, UN [26];
- works of domestic researchers, posted on the platforms Elsevier, PubMed, Web of science, Google Scholar, which are devoted to the issues of therapy and prevention of GH;
- State Register of Medicines of Ukraine [27];
- Online resources for searching for GH «Tabletki.ua» [28], «Helsi.me» [29], «Compendium» [30], «eliky» [31];
- data of the domestic retail pharmaceutical market of GH, their price characteristics, posted on online resources for searching for GH.

To solve the tasks set, the following common and special methods were used [32]:

- decomposition method: a universal method for solving complex tasks or studying complex objects by structuring and breaking them down into a series of interconnected simple tasks or objects;
- analysis: the subject of study (object, properties, etc.) is decomposed into separate components;
- synthesis: combining individual aspects of the subject of study into a single whole;

- comparison: identifying differences between objects of the material world or finding common ground in them using the senses or special devices;
- generalization: defining a general concept that reflects the main or basic thing that characterizes objects of a certain class.

The study of the actual state of the legislative framework for regulating the circulation of drugs was carried out using the following methods [32]:

- bibliosemantic: clarification of the state of studying the problem and ways to solve it through the analysis of previous studies based on scientific literary sources, electronic resources;
- content analysis: a qualitative-quantitative method of studying documents, which is characterized by the objectivity of conclusions and the rigor of the procedure and consists in the quantification processing of the text with subsequent interpretation of the results;
- structural-logical (functional) analysis: selection of scientific data from selected literary sources according to a certain logic, their classification, establishment of connections and relationships between them.

For the marketing research of the LAD segment (distribution by trade name (TN), dosage form, country of manufacture, composition, activity), descriptive statistics (percentage values) were used

The study was conducted in several stages, the algorithm of which is presented in Fig. 2.1.

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].

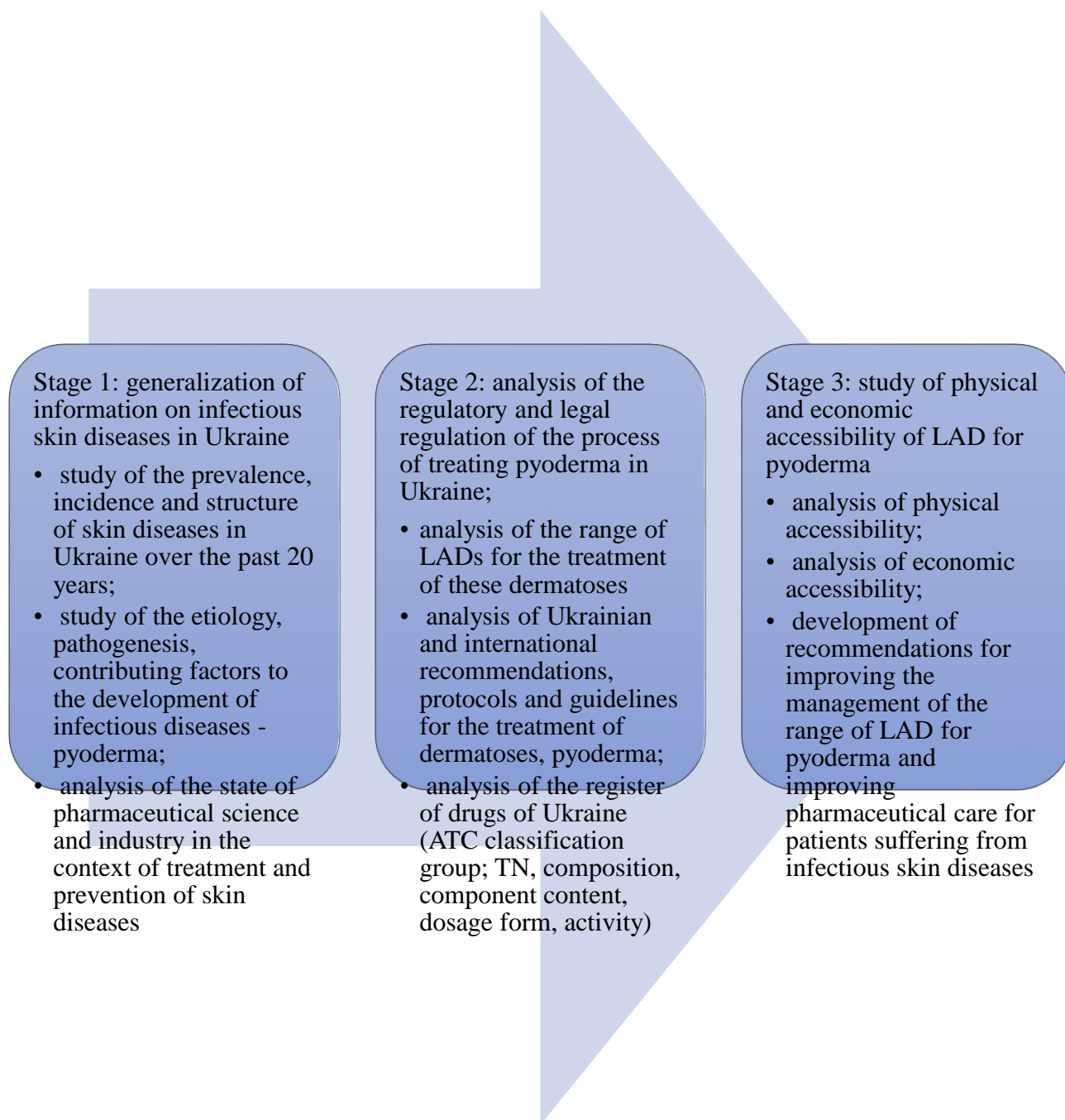


Figure 2.1 – Stages and general research methodology (Source: own development)

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:

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

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](http://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.

### **Conclusions**

A set of marketing research methods for the LAD segment for pyoderma is proposed, which will allow obtaining new data regarding the level of development of the domestic pharmaceutical sector.

## SECTION 3

### FEATURES OF THE UKRAINIAN MARKET OF LOCAL ANTIBACTERIAL MEDICINES USED IN PYODERMIAS

#### **3.1 Analysis of the regulatory framework for the provision of medical and pharmaceutical care for dermatoses**

Before conducting a detailed analysis of the range of LADs for the treatment of pyoderma, we decided to analyze modern international recommendations and standards for the use of such agents in dermatovenereology, namely, guideline 00274 «Impetigo and other pyodermas» [36], which is a list of recommended international protocols by Duodecim Medical Publications Ltd. No other information could be found in the industry standards and guidelines of the State Expert Center of the Ministry of Health [37].

This guideline suggests the following treatment regimen based on level A and B evidence:

Treatment should be initiated based on the clinical presentation [36].

- If the disease is limited to a small area, treatment consists of soaking the crusts until they are detached and applying an antimicrobial ointment (fusidic acid, neomycin, and bacitracin). [Evidence 02007 |A] or a combination
- If the disease has spread to a larger area (> 6 cm<sup>2</sup>), the systemic antimicrobial cephalexin is used as the first-line agent [Evidence 03008 |B] . Other antimicrobials that are effective against *Staphylococcus aureus* are also effective and can be used: flucloxacillin 750–1000 mg 3 times a day or a combination of amoxicillin and clavulanic acid 875/125 mg 2 times a day. Patients with cephalosporin allergy can be treated with clindamycin.
- If the patient has eczema, a topical product containing a glucocorticoid and an antimicrobial should be used in conjunction with systemic antimicrobials as long as the skin is intact.
- Do not neglect follow-up treatment for eczema.

Most common causes of poor immune response to treatment:

- Misdiagnosis. The patient has scabies, lice, or ringworm.
- The crusts were not soaked and removed. Bacteria can survive under the crusts.
- The underlying condition of the eczema was not treated.
- The nostrils serve as a reservoir for bacteria (neomycin + bacitracin or fusidic acid ointment is applied to the nostrils. Mupirocin should not be used for this condition, as its use should be limited to eradicating methicillin-resistant *Staphylococcus aureus*).

So, as we see, the evidence supports the importance of LAD in the treatment of pyoderma.

### **3.2 Research on the range of topical antibacterial drugs used in dermatology**

According to the ATC classification, drugs classified as group D – drugs used in dermatological skin diseases – are used for the treatment of pyoderma.

This group includes subgroup D06 – Antibiotics and chemotherapeutic drugs for topical use in dermatology; D07C – corticosteroids in combination with antibiotics for external use; D08 – antiseptics and disinfectants.

According to the selected sections, the State Register of Medicinal Products of Ukraine was analyzed, the results of the aggregate analysis are presented in Table 3.1.

35 trade names (TN) of drugs were removed from the list specified in the register for further analysis.

44.8% of registered TN drugs belong to subgroup D06, 35.2% of registered TN drugs belong to subgroup D07C; subgroup D08 includes 21.0% of all registered TNs of LAD (Fig. 3.1).

Table 3.1 – List and main characteristics of local antibacterial drugs for the treatment of pyoderma registered in Ukraine

№	Name	Manufacturer	Main active ingredients	Release form and volume	Activity
1	2	3	4	5	6
<i>D06 Antibiotics and chemotherapeutic drugs for topical use</i>					
1	Neomycin plus	Pharmaceutical company «Zdorovya», Ukraine	bacitracin zinc 250 IU; neomycin sulfate 5000 IU	ointment, 10 g or 20 g in a tube; cutaneous powder, 10 g in a container or in a bottle	Corynebacterium diphtheriae, Streptococcus faecalis
2	Baneocin	Sandoz GmbH, Austria	bacitracin zinc 250 IU; neomycin sulfate 5000 IU	ointment 5 g or 20 g in a tube; cutaneous powder 10 g of powder in a container	hemolytic streptococcus staphylococcus Clostridium spp., Corynebacterium diphtheriae, Treponema pallidum, as well as against some gram-negative pathogenic microorganisms, such as Neisseria spp. and Haemophilus influenzae.
3	Fuzicutan	mibe GmbH Artznaymittel, Germany	1 g of cream contains: 20 mg of fusidic acid	cream 2% 5 g, 10 g, 15 g or 30 g in a tube; 1 tube in a cardboard pack	Staphylococcus spp., Streptococcus spp., Corynebacterium minutissimum and Propionibacterium
4	Bactafuz	Encube Ethicals Pvt. Ltd., India	fusidic acid; 1g of cream contains fusidic acid 20 mg box	cream 20 mg/g, 15 g in a tube in a cardboard	Staphylococcus aureus Streptococcus spp., Corynebacteria spp., Neisseria spp., Clostridia spp.
5	Fusiderm	Pharma International Company, Jordan	1 g of cream contains fusidic acid 20 mg	cream, 20 mg/g, 15 g in an aluminum tube; 1 tube in a cardboard box	Staphylococcus spp Streptococcus spp., Corynebacterium minutissimum, Corynebacteria spp., Neisseria spp., Clostridia spp.

Continuation of Table 3.1

1	2	3	4	5	6
6	Synthomycin	PJSC «Chempharmaceutical Plant «Chervona Zirka», Ukraine	1 g of liniment contains synthomycin 50 mg	liniment for external use, 50 mg/g; 25 g in a tube; 1 tube in a cardboard pack	Staphylococcus spp.) Streptococcus spp.) Gram-negative cocci (Neisseria gonorrhoeae, Neisseria meningitides) many bacteria (Escherichia coli, Haemophilus influenzae, Salmonella spp., Shigella spp., Klebsiella spp., Serratia spp., Proteus stuartii, Yersinia)
7	Levomycetin alcohol solution 0.25%	PJSC "FITOPHARM", Ukraine	1 ml of solution contains chloramphenicol 2.5 mg	cutaneous solution, alcohol 0.25%, 25 ml in bottles	Acts on gram-positive and gram-negative bacteria
8	Chitosan-Genta	LLC "EURASIA", Ukraine	1 g of gel contains gentamicin sulfate 1 mg	gel 0.1% 5 g in sachets; 15 g, 30 g, 100 g in a tube; 1 tube in a cardboard pack	Has a pronounced bacteriostatic effect on gram-positive and gram-negative microorganisms
9	Tyrozur	Engelhardt Arzneimittel GmbH & Co. KG, Germany	1 g of powder contains 1 mg of tyrothricin	cutaneous powder, 1 mg/g 5 g or 20 g of powder in a bottle; 1 bottle in a cardboard box	Staph. Aureus MSSA Staph. Aureus MRSA Staph. Haemolyticus Strep. Pyogenes Strep. Viridans Enterococcus faecalis Diplococcus pneumoniae, Corynebact. spp. Neisseria meningitides, Neisseria gonorrhoeae,
10	Bactopic	KUSUM HEALTHCARE PVT LTD, India	1 g of ointment contains 20 mg of mupirocin	ointment, 2% 15 g of ointment in an aluminum tube; 1 tube in a cardboard box	Staphylococcus aureus Escherichia coli Haemophilus influenzae
11	Bactroban	Glaxo Operations UK Limited, United Kingdom	1 g of ointment contains 20 mg of mupirocin	ointment, 2% 15 g of ointment in an aluminum tube; 1 tube in a cardboard box	Staphylococcus aureus Escherichia coli Haemophilus influenzae

Continuation of Table 3.1

1	2	3	4	5	6
12	Sulfargin	JSC Tallinn Pharmaceutical Plant, Estonia JSC "Grindeks", Latvia	1 g of ointment contains 10 mg of silver sulfadiazine	ointment, 10 mg/g 50 g in an aluminum tube; 1 tube in a cardboard box	Effective against gram-positive and gram-negative bacteria
13	Argosulfan	Farmzavod Yelfa A.T., Poland	1 g of the drug contains silver sulfathiazole 20 mg;	cream, 20 mg/g; 15 g or 40 g in a tube; 1 tube in a cardboard box	<i>Pseudomonas aeruginosa</i> Acts on gram-positive and gram-negative bacteria
14	Streptocide ointment 5%	PrJSC Pharmaceutical Factory "Viola", Ukraine	1 g of ointment contains sulfonamide 50 mg (0.5 g)	ointment 5% 25 g in an aluminum tube; 1 tube in a cardboard pack; 25 g in aluminum tubes; 25 g in containers; 25 g or 40 g in a laminate tube; 1 tube in a cardboard pack; 25 g or 40 g in laminate tubes	Streptococci and other microorganisms
15	Streptocide	LLC "Istok-Plus", Ukraine	1 sachet contains 2 g or 5 g of sulfonamide; 1 polymer bottle contains 15 g of sulfonamide	cutaneous powder 2 g or 5 g in a sachet; 20 sachets in a cardboard box; 15 g in a polymer bottle; 1 polymer bottle in a cardboard box	<i>Escherichia coli</i> <i>Shigella</i> spp., <i>Vibrio cholera</i> <i>Clostridium perfringens</i> <i>Bacillus anthracis</i> <i>Corynebacterium diphtheria</i> <i>Yersinia pestis</i>
<i>D07C - Corticosteroids in combination with antibiotics for external use</i>					
16	Hyoxysone	PJSC "Khimfarmzavod "Chervona Zirka", Ukraine	hydrocortisone acetate 10 mg, oxytetracycline hydrochloride 30 mg	ointment, 15 g of ointment in a tube; 1 tube in a cardboard pack	Acts on gram-positive and gram-negative bacteria

Continuation of Table 3.1

1	2	3	4	5	6
17	Pimafucort	Temmler Italia S.r.l., Italy	1 g of ointment contains 10 mg of natamycin, 10 mg of hydrocortisone, 3.5 mg of neomycin	15 g of ointment in a tube; 1 tube in a cardboard box	Active against some gram-positive (staphylococci, enterococci) and gram-negative (Klebsiella spp., Proteus spp., Escherichia coli) bacteria. Pseudomonas aeruginosa is resistant to neomycin in vitro
18	Oxycort	Tarkhominskiy Pharmaceutical Plant "Polfa" JSC, Poland	1 g of suspension contains oxytetracycline hydrochloride 9.30 mg and hydrocortisone 3.10 mg	aerosol for application to the skin, suspension (9.30 mg + 3.10 mg) / g 32.25 g in an aerosol can; 1 can in a cardboard box	Acts on gram-positive and gram-negative bacteria
19	Belogent	Belupo, medicines and cosmetics, d.d., Croatia	1 g of cream contains betamethasone dipropionate 0.640 mg, which corresponds to 0.500 mg of betamethasone; gentamicin sulfate 1.66 mg, which corresponds to 1.00 mg of gentamicin	cream 15 g or 30 g in a tube; 1 tube in a cardboard pack	Has an antibacterial effect on gram-negative bacteria (proteus, Escherichia coli) and some gram-positive bacteria, including penicillin-resistant staphylococci.
20	Betazon Ultra	Limited Liability Company "Pharmaceutical Company "Zdorovya", Ukraine Limited Liability Company "PHARMEX GROUP" (quality control), Ukraine	1 g of the drug contains micronized betamethasone dipropionate equivalent to betamethasone 0.5 mg, clotrimazole 10 mg, gentamicin sulfate equivalent to gentamicin 1 mg	cream for external use 15 g or 30 g in a tube; 1 tube in a cardboard box	Escherichia coli Haemophilus influenzae Moraxella lacunata Neisseria

Continuation of Table 3.1

1	2	3	4	5	6
21	Bactafuz-B	Encube Ethicals Pvt. Ltd., India	1 g of cream contains fusidic acid 20 mg, betamethasone valerate equivalent to betamethasone 1 mg	cream; 15 g in a tube; 1 tube in a cardboard box	Staphylococcus aureus Streptococci Corynebacteria, Neisseria Clostridia Bacteroides
22	Triderm	Organon Heist bv, Belgium	1 g of cream contains: betamethasone (in the form of dipropionate) 0.5 mg, clotrimazole 10 mg and gentamicin (in the form of sulfate) 1 mg	cream, 15 g in an aluminum tube; 1 tube in a cardboard box; 30 g in an aluminum tube; 1 tube in a cardboard box	Escherichia coli Haemophilus influenzae Moraxella lacunata, Neisseria, Proteus, Pseudomonas Staphylococcus aureus, Staphylococcus epidermidis Serratia
23	Celestoder m-B with Garamycin	Organon Heist bv, Belgium	1 g of cream contains 1 mg of betamethasone (in the form of 17-valerate) and 1 mg of gentamicin (in the form of sulfate)	30 g of cream in a tube; 1 tube in a cardboard box	Staphylococcus aureus Pseudomonas aeruginosa, Aerobacter aerogenes Escherichia coli Proteus vulgaris Klebsiella pneumoniae
24	Betaderm	Farmzavod Jelfa A.T., Poland	1 g of ointment contains betamethasone (in the form of betamethasone dipropionate) 0.5 mg; gentamicin (in the form of gentamicin sulfate) 1 mg	ointment, 15 g in a tube; 1 tube in a cardboard box	Staphylococcus aureus Pseudomonas aeruginosa, Aerobacter aerogenes Escherichia coli Proteus vulgaris Klebsiella pneumoniae

Continuation of Table 3.1

1	2	3	4	5	6
25	Triakutan	PJSC "Kyivmedpr eparat", Ukraine	1 g of cream contains: betamethasone dipropionate - 0.64 mg; gentamicin sulfate in terms of gentamicin - 1.0 mg; clotrimazole - 10 mg – betamethasone dipropionate, in terms of 100% substance; gentamicin sulfate, in terms of gentamicin (in terms of anhydrous gentamicin); - clotrimazole, in terms of 100% substance	cream 15 g in a tube, 1 tube in a pack	Staphylococcus aureus Pseudomonas aeruginosa Aerobacter aerogenes Escherichia coli Proteus vulgaris Klebsiella pneumoniae
<i>D08 - Antiseptics and disinfectants</i>					
26	Flucinar	Farmzavod Yelfa A.T., Poland	1 g of ointment contains fluocinolone acetonide 0.25 mg, neomycin sulfate 5	mg 15 g ointment in a tube; 1 tube in a cardboard box	Has a bactericidal effect on gram-positive and some gram-negative bacteria
27	Kremgen	Joint Ukrainian-Spanish Enterprise "Sperco Ukraine", Ukraine	1 g of ointment contains fluocinonide 0.5 mg, gentamicin sulfate 1 mg in terms of gentamic	in ointment 15 g or 30 g in a tube; 1 tube in a pack	Streptococcus spp. Staphylococcus spp Pseudomonas spp Escherichia coli Proteus spp Klebsiella spp Shigella spp. Salmonella spp., Enterobacter spp., Acinetobacter spp
28	Decasan	LLC "Yuria-Pharm", Ukraine	1 ml of solution contains 0.2 mg of decamethoxine	solution 0.2 mg/ml, 50 ml or 100 ml, or 200 ml or 400 ml in glass bottles; 50 ml or 100 ml, or 250 ml, or 500 ml, or 1000 ml, or 2000 ml, or 3000 ml, or 5000 ml in polymer containers; 2 ml or 5 ml in a single-dose container, 4, or 8, or 10, or 12 containers in a cardboard pack	has a pronounced bactericidal effect on staphylococci, streptococci

Continuation of Table 3.1

1	2	3	4	5	6
29	Panthenol plus	LLC "Ternofarm", Ukraine	1 g of cream contains chlorhexidine dihydrochloride 5 mg, dexpanthenol 50 mg	cream, 30 g in an aluminum tube; 1 tube in a cardboard pack	Staphylococcus aureus
30	Bepanthen Plus	GP Grenzach Productions GmbH, Germany	1 g of cream contains dexpanthenol 50 mg, chlorhexidine dihydrochloride 5 mg	cream 100 g, 30 g or 3.5 g in a tube; 1 tube in a cardboard box	Staphylococcus aureus
31	Ryativnik	PJSC "Kyivmedpreparat", Ukraine	1 g of cream contains dexpanthenol in terms of 100% substance 50 mg, chlorhexidine bigluconate 20% solution in terms of 20% solution 38.8 mg	cream 15 g or 30 g in a tube; 1 tube in a pack	Staphylococcus aureus
32	Furacilin	LLC "Istok-Plus", Ukraine	1 sachet contains nitrofurazone 40 mg; tablets for preparation of solution for external use 20 mg, 10 tablets in blisters; 10 tablets in a blister, 2 blisters in a pack	powder for solution for external use 40 mg 2 g of powder in a sachet; 10 or 20 sachets in a cardboard box	Staphylococci Streptococci Dysenteric and Escherichia coli, salmonella

Continuation of Table 3.1

1	2	3	4	5	6
33	Braunodin	B. Braun Melsungen AG (batch production), Germany B. Braun Medical AG, Switzerland	100 g of solution contains 7.5 g of povidone-iodine (with an active iodine content of 10%), which corresponds to 0.75 g of active iodine cutaneous	solution, 7.5%, 100 ml in polyethylene bottles, 250 ml in polyethylene bottles with a spray pump, 20 bottles in a cardboard box	gram-positive and gram-negative bacteria
34	Iodadin	LLC "DKP "Pharmaceutical Factory", Ukraine	1 ml of solution contains povidone-iodine (calculated as 10% active iodine content) 100 mg	solution for external and local use 10% 30 ml or 120 ml in bottles; 30 ml or 120 ml in bottles, 1 bottle in a pack	gram-positive and gram-negative bacteria
35	Povidone-Iodine Vayum	LLC "ELADUM PHARMA", Republic of Moldova	100 ml of solution contains povidone-iodine 10.0 g	cutaneous solution 100 mg/ml, 30 ml, 50 ml, 100 ml in a bottle; 50 ml in a bottle with a sprayer; 1 bottle in a pack; 500 ml in a bottle	gram-positive and gram-negative bacteria

An analysis of selected TNs of drugs by country of manufacture showed that among the antibacterial local drugs for the treatment of pyoderma presented on the market, 42.8% are drugs of domestic production, including a joint Ukrainian-Spanish enterprise in the form of a limited liability company «Sperco Ukraine», 57.2% are drugs of foreign companies.

A detailed analysis of the distribution of drugs by producing countries is presented in Fig. 3.2.

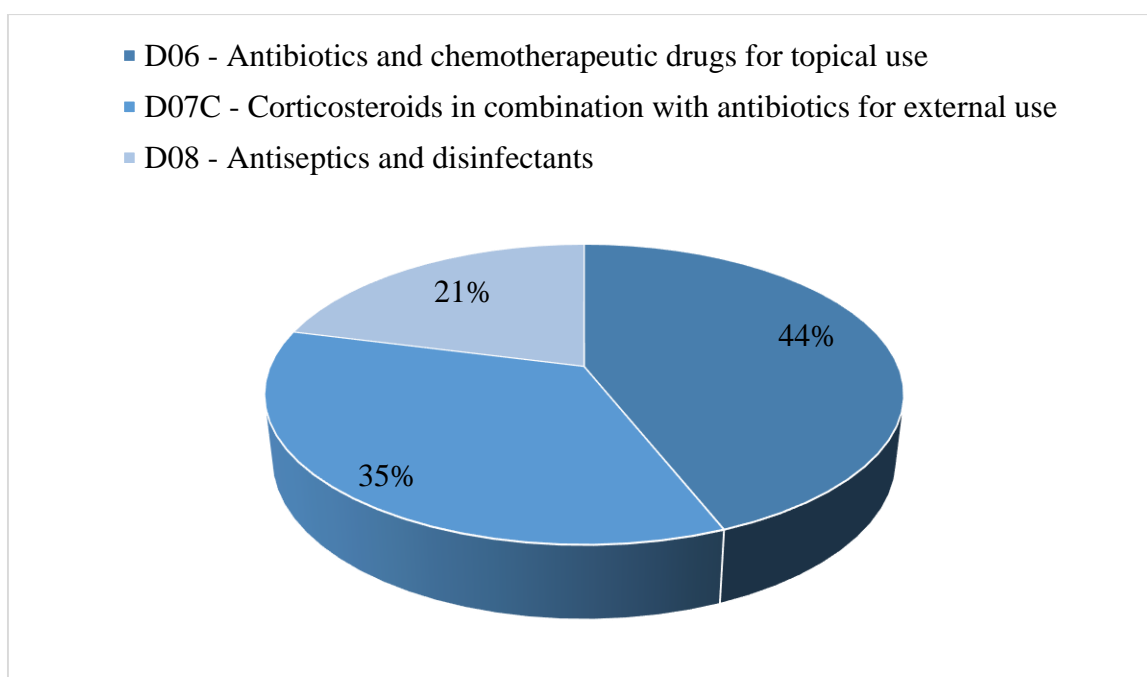


Figure 3.1 – Diagram of distribution of TN LAD by subgroups of the ATS classification

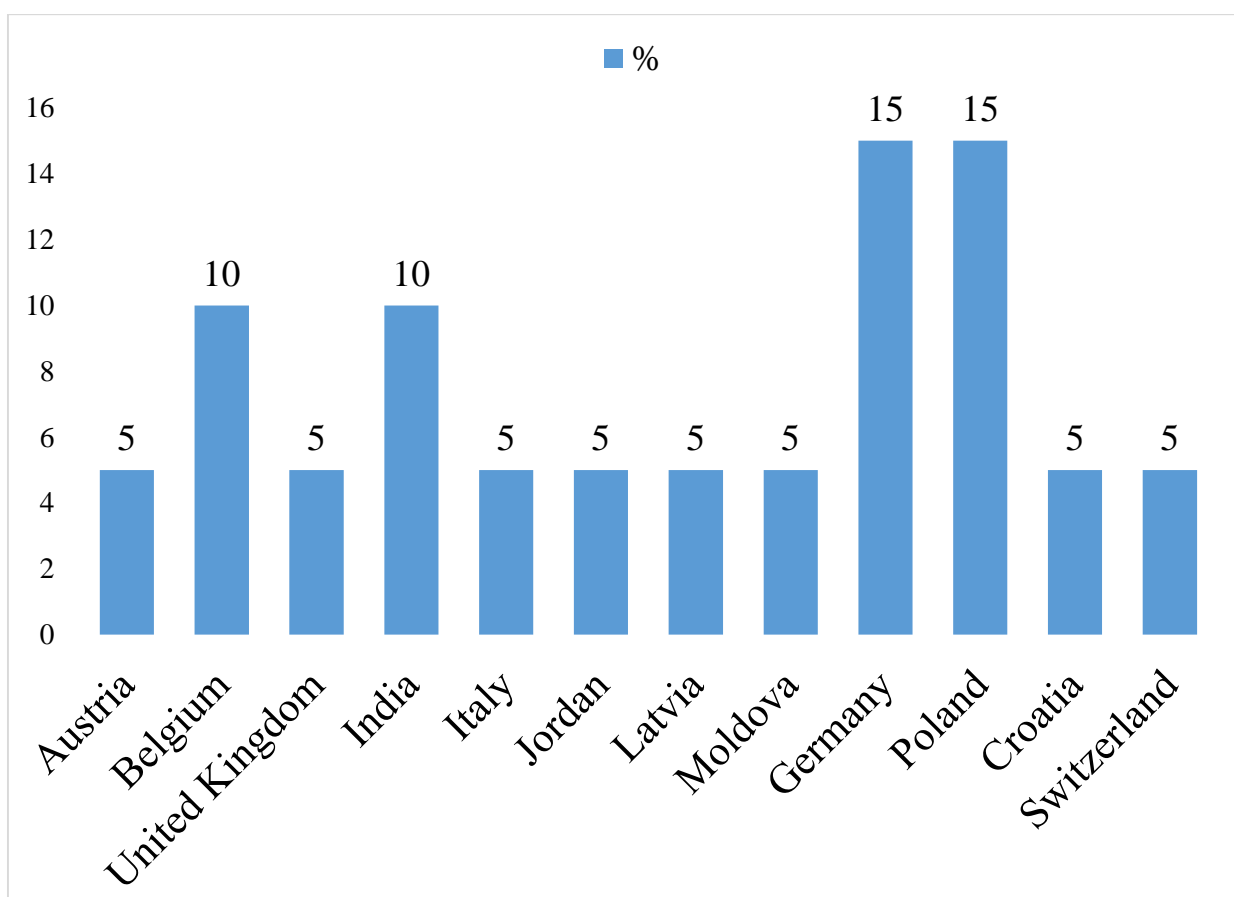


Figure 3.2 – Distribution of antibacterial drugs by country of manufacture

The predominance of foreign manufacturers in the domestic pharmaceutical market has a negative impact on both the consumer (due to high prices) and the economy as a whole (lack of economic patriotism).

Encouraging Ukrainian pharmaceutical enterprises to expand production will improve the quality of pharmaceutical care, reduce dependence on imported goods and promote the country's economic growth.

In addition, such a strategy in the market will create new jobs, promote the development of the scientific and research base and stimulate innovations in the pharmaceutical industry. In general, increasing the production of drugs by Ukrainian companies can have a positive social, economic and scientific impact.

At the next stage of the study of antibacterial drugs, their component structure was established (single-component, combined).

It was determined that single-component drugs occupy 40% of the range, among multi-component drugs only two-component drugs were identified - 60% (Fig. 3.3).

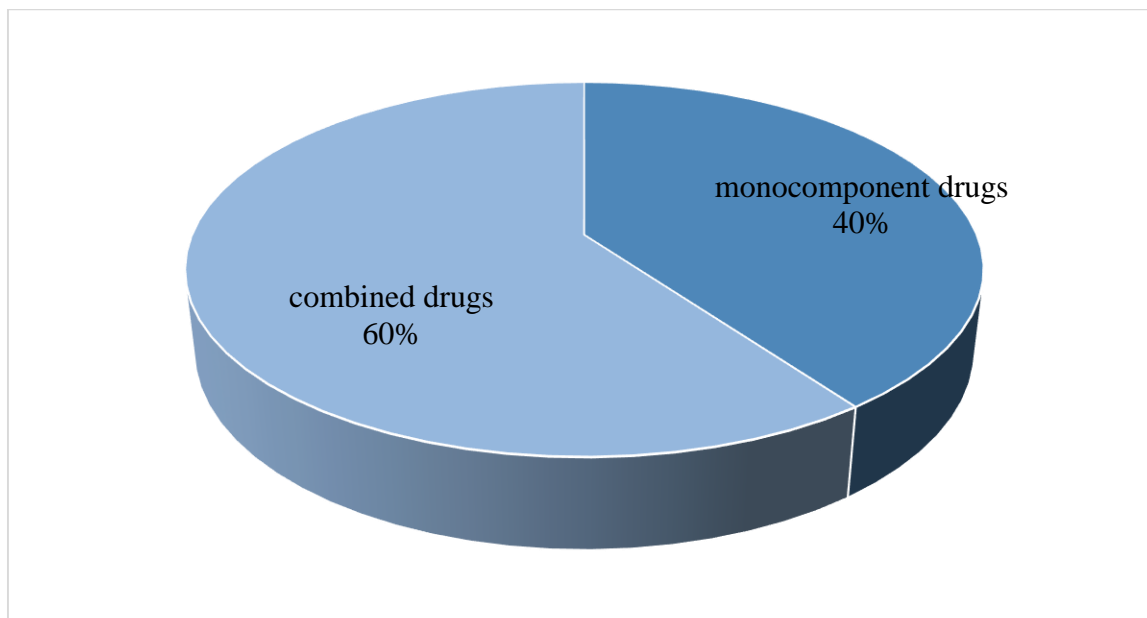


Figure 3.3 – Distribution diagram of local antibacterial drugs for the treatment of pyoderma by composition

Single-component drugs, as can be seen from Table 3.1, have only a unidirectional antibacterial effect, which significantly reduces the coverage of patients' needs in the symptomatic treatment of pyoderma. Unlike monodrugs, combination drugs allow you to achieve the desired effect faster due to additional anti-inflammatory, antibacterial, healing and other properties.

The disadvantage, in our opinion, is the content of the hormonal component - glucocorticosteroid in all combined drugs. As of today, it has been established that these active pharmaceutical ingredients cause "withdrawal syndrome", atrophy of the skin and are undesirable in pediatric practice.

Therefore, at the current stage of scientific development, there is a need for safer LADs for pyoderma (for example, on plant bases, etc.)

The distribution of LADs by dosage form was also established (Fig. 3.4). Solid drugs cover 11% of the range, soft drugs – 74%, transdermal solutions – 14%, gaseous drugs – 2%.

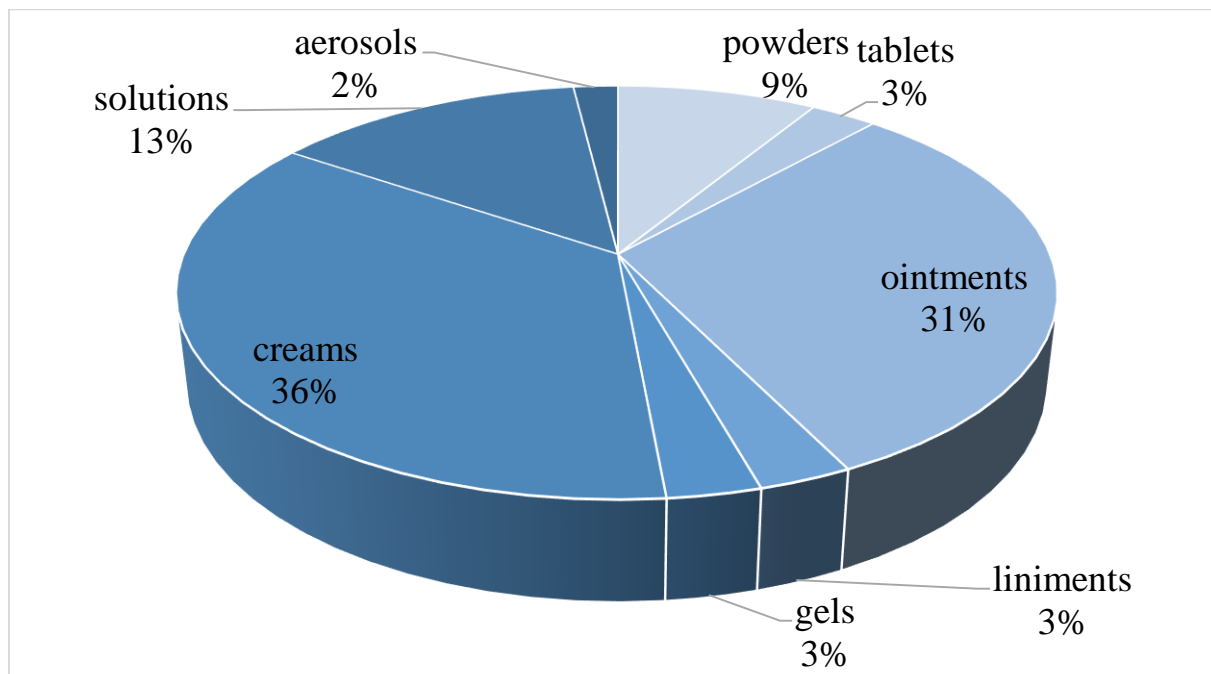


Figure 3.4 – Distribution diagram of local antibacterial drugs by dosage forms

Among the dosage forms, creams and ointments for external use predominate. Tablets, for example, furatsilin, which are dissolved in water and used as an antiseptic in the treatment of wounds, are also presented.

The aerosol dosage form, which is used as an additional element of therapy to relieve itching and pain, is easy to use, fast to apply and effective, turned out to be smaller in terms of market coverage.

In view of the above, the development of not only new LAD fillings, but also the study of new possible forms of transcutaneous drug delivery remains relevant.

### **Conclusions to section 3**

According to the results of the conducted research, it was found that:

- in dermatology, for the treatment of pyoderma, guideline 00274 “Impetigo and other pyodermas” is used as a roadmap, which is a list of recommended international protocols of Duodecim Medical Publications Ltd, according to which systemic and local antibiotics are used in the treatment;
- according to the results of the analysis of the State Register of Medicines of Ukraine, namely subgroups D06, D07C, D08, it was found that 43% of LAD for the treatment of pododerma are manufactured by a domestic manufacturer; single-component drugs occupy 40% of the assortment; the predominant dosage form is a soft dosage form (74%), represented by ointments (31.4%), liniments (2.8%), gels (2.8%), creams (37%).
- need to develop new LAD both in terms of component composition and release form has been identified, due to the limited use of hormones in pediatric practice, the need for additional symptomatic treatment and rapid therapeutic action.

## SECTION 4

### ASSESSMENT OF THE AVAILABILITY OF TOPICAL ANTIBACTERIAL MEDICINES USED IN DERMATOLOGY

#### 4.1 Study of the physical availability of topical antibacterial drugs for pyoderma

Given the wartime circumstances that directly affect the quality of pharmaceutical provision of drugs to patients in cities and villages, the analysis of the physical availability of the drugs analyzed above in pharmacies remains relevant.

To establish the physical availability of local antimicrobial drugs registered in Ukraine, 6 cities of Ukraine were selected: two front-line ones - Kherson and Kharkiv; two cities in central Ukraine - Kyiv and Cherkasy; two western cities - Lviv and Uzhgorod. The online drug search resource "Tabletki.ua" was chosen as the source of information due to its accessible and understandable interface and the ability to use filters. The generalized results of the analysis are presented in Table 4.1.

According to the results of the analysis, it was determined that the physical availability of local antibacterial drugs (by trade name) is 82%, which is a fairly good indicator.

The following products were unavailable for online ordering: cream "Bactafuz", cream "Fusiderm", gel "Chitosan-Genta", ointment "Bactopic", aerosol "Oxycort" (except for Lviv), cream "Bactafuz-B", and solution "Braunodin" is absent only in the front-line city of Kherson.

It should be noted that no particular difference in physical availability was found between the front-line, central and western regions. This indicates the restoration of the logistical processes of pharmaceutical supply compared to the beginning of 2022, despite the protracted nature of the military conflict.

Table 4.1 – Summary table of physical availability of local antibacterial drugs in cities of Ukraine as of October 2025

№	Trade name	City					
		Kherson	Kharkiv	Kyiv	Cherkasy	Lviv	Uzhhorod
1	Neomycin plus	+	+	+	+	+	+
2	Baneocin	+	+	+	+	+	+
3	Fuzikutan	+	+	+	+	+	+
4	Bactafuz	-	-	-	-	-	-
5	Fusiderm	-	-	-	-	-	-
6	Synthomycin	+	+	+	+	+	+
7	Levomycetin alcohol solution	+	+	+	+	+	+
8	Chitosan-Genta	-	-	-	-	-	-
9	Tyrozur	+	+	+	+	+	+
10	Bactopic	-	-	-	-	-	-
11	Bactroban	+	+	+	+	+	+
12	Sulfargin	+	+	+	+	+	+
13	Argosulfan	+	+	+	+	+	+
14	Streptocide ointment	+	+	+	+	+	+
15	Streptocide	+	+	+	+	+	+
16	Hyoxysone	+	+	+	+	+	+
17	Pimafucort	+	+	+	+	+	+
18	Oxycort	-	-	-	-	+	-
19	Belogent	+	+	+	+	+	+
20	Betazon Ultra	+	+	+	+	+	+
21	Baktafuz-B	-	-	-	-	-	-
22	Triderm	+	+	+	+	+	+
23	Celestoderm-V	+	+	+	+	+	+
24	Betaderm	+	+	+	+	+	+
25	Triacutane	+	+	+	+	+	+
26	Flucinar	+	+	+	+	+	+
27	Kremgen	+	+	+	+	+	+
28	Triderm	+	+	+	+	+	+
29	Celestoderm-V	+	+	+	+	+	+
30	Betaderm	+	+	+	+	+	+
31	Triacutane	+	+	+	+	+	+
32	Flucinar	+	+	+	+	+	+
33	Kremgen	-	+	+	+	+	+
34	Triderm	+	+	+	+	+	+
35	Celestoderm-V	+	+	+	+	+	+

## 4.2 Analysis of the price situation of antibacterial dermatological drugs

In the course of further research, to assess the economic affordability of LAD, for permanent market positions, the solvency adequacy ratio was calculated.

The analysis was conducted for the cities used in the study of physical accessibility and using the online drug search resource "Tabletki.ua". To establish the category of drug accessibility, the minimum and maximum retail prices were analyzed and the weighted average retail price of the monthly course of use was calculated. All physically available local antibacterial drugs were divided into three categories: highly accessible (Ka.s less than 5%), moderately accessible (Ka.s more than 5%, but less than 15%) and poorly accessible (Ka.s more than 15%) (Table 4.2).

Table 4.2 – Indicators of affordability of local antibacterial drugs

<b>№</b>	<b>Trade name</b>	<b>Minimum retail price (UAH)</b>	<b>Weighted average retail price (UAH)</b>	<b>Maximum retail price (UAH)</b>	<b>Ka.s</b>
1	2	3	4	5	6
<b>Kherson</b>					
1	Neomycin plus	90.50	95.55	102.60	0.54
2	Baneocin	176.38	225.24	274.10	1.29
3	Fuzikutan	188.18	214.54	240.90	1.23
4	Synthomycin	116.38	122.89	129.40	0.70
5	Levomycetin alcohol solution	19.83	25.96	32.10	0.14
6	Chitosan-Genta	143.20	151.35	159.51	0.86
7	Tyrozur	187.11	209.55	232.00	1.20
8	Bactopic	398.00	411.05	424.10	2.35
9	Bactroban	298.39	344.14	389.90	1.97
10	Sulfargin	39.43	49.71	60.00	0.28
11	Argosulfan	16.30	21.65	27.00	0.12
12	Streptocide ointment	113.25	134.47	155.70	0.77
13	Streptocide	289.60	347.05	404.50	1.98
14	Hyoxysone	103.82	130.81	157.80	0.74
15	Pimafucort	133.56	150.29	167.02	0.86
16	Belogent	195.63	228.28	260.94	1.30

continued table 4.2

1	2	3	4	5	6
17	Betazon Ultra	298.90	336.4	373.90	1.92
18	Triderm	124.14	159.47	194.80	0.91
19	Celestoderm-V	183.80	216.55	249.30	1.24
20	Betaderm	147.80	177.7	207.60	1.01
21	Triacutane	170.70	198.80	226.90	1.13
22	Flucinar	129.48	176.79	224.10	1.01
23	Kremgen	96.90	118.45	140.00	0.67
24	Bepanthen plus	238.40	277.2	316.00	1.58
25	Rescuer	156.80	201.2	245.60	1.15
26	Furacilin	79.47	100.73	122.00	0.57
27	Iodadin	97.00	123.20	149.40	0.70
28	Povidone-iodine	140.29	155.99	171.70	0.89
<b>Kharkiv</b>					
1	Neomycin plus	89.66	95.73	101.80	0.54
2	Baneocin	205.52	245.41	285.30	1.40
3	Physical therapist	190.80	204.3	217.80	1.17
4	Synthomycin	98.48	113.84	129.20	0.65
5	Levomycetin alcohol solution	15.90	22.6	29.30	0.12
6	Tyrozur	137.90	161.95	186.00	0.92
7	Bactroban	189.68	210.94	232.30	1.20
8	Sulfargin	412.68	418.39	424.10	2.39
9	Argosulfan	290.00	327.15	364.30	1.87
10	Streptocide ointment	28.62	43.36	58.10	0.24
11	Streptocide	17.30	20.25	23.20	0.11
12	Gyoxysone	109.80	125.10	140.40	0.71
13	Pimafucort	288.50	333	377.50	1.90
14	Belogent	104.95	159.27	213.60	0.91
15	Betazon ultra	135.00	147.50	160.00	0.84
16	Triderm	207.80	229.50	251.20	1.31
17	Celestoderm-V	278.76	307.18	335.61	1.76
18	Betaderm	124.14	156	187.90	0.89
19	Triacutan	179.50	202.7	225.90	1.16
20	Flucinar	156.10	164.54 r	172.98	0.94
21	Kremgen	179.90	181.66	183.42	1.04
22	Dekasan	119.60	139.95	160.30	0.80
23	Panthenol plus	96.80	105.15	113.50	0.60
24	Bepanten plus	235.80	264.45	293.10	1.51
25	Rescuer	133.20	165.25	197.30	0.94
26	Furacilin	79.46	88.41	97.36	0.50

continued table 4.2

1	2	3	4	5	6
27	Braunodin	71.20	71.20	71.20	0.40
28	Yodadin	81.50	115.45	149.40	0.66
<b>Kyiv</b>					
1	Neomycin plus	89.66	101.73	113.80	0.58
2	Baneocin	119.52	210.66	301.80	1.20
3	Fuzikutan	185.00	217.7	250.40	1.24
4	Synthomycin	97.90	115.78	133.67	0.66
5	Levomycetin alcohol solution	16.00	21.50	27.00	0.12
6	Tyrozur	135.73	126.65	177.50	0.72
7	Bactroban	190.71	215.10	239.50	1.23
8	Sulfargin	410.55	417.32	424.10	2.39
9	Argosulfan	268.80	327.12	385.44	1.87
10	Streptocide ointment	30.63	45.91	61.20	0.26
11	Streptocide	12.00	17.75	23.50	0.10
12	Gyoxysone	108.14	123.37	138.60	0.70
13	Pimafucort	280.30	326.65	373.00	1.87
14	Belogent	100.78	125.44	150.10	0.71
15	Betazon Ultra	129.20	143.29	157.38	0.82
16	Triderm	205.31	236.15	267.00	1.35
17	Celestoderm-V	201.20	211.00	220.80	1.20
18	Betaderm	113.10	148.75	184.40	0.85
19	Triacutan	171.40	208.7	246.00	1.19
20	Flucinar	138.92	179.41	219.90	1.02
21	Kremgen	166.13	189.56	213.00	1.08
22	Dekasan	107.00	137.65	168.30	0.78
23	Panthenol Plus	98.10	105.8	113.50	0.60
24	Bepanten Plus	240.97	292.53	344.10	1.67
25	Rescuer	149.70	180.55	211.40	1.03
26	Furacilin	77.84	87.60	97.36	0.50
27	Braudonin	60.32	65.76	71.20	0.37
28	Iodadin	88.05	118.17	148.30	0.67
<b>Cherkasy</b>					
1	Neomycin plus	89.66	96.18	102.70	0.55
2	Baneocin	160.96	198.59	236.22	1.13
3	Fuzikutan	188.18	194.74	201.30	1.11
4	Synthomycin	99.38	113.14	126.90	0.64
5	Levomycetin alcohol solution	11.90	19.02	26.14	0.10
6	Tyrozur	139.50	148.31	157.13	0.85
7	Bactroban	190.71	210.26	229.81	1.20
8	Sulfargin	415.71	419.90	424.10	2.40
9	Argosulfan	296.93	312.21	327.50	1.78

continued table 4.2

1	2	3	4	5	6
10	Streptocide ointment	35.31	48.55	61.80	0.27
11	Streptocide	14.20	19.45	24.70	0.11
12	Gyoxysone	108.22	119.11	130.00	0.68
13	Pimafucort	280.44	317.32	354.20	1.81
14	Belogent	101.62	125.86	150.10	0.72
15	Betazon ultra	129.20	145.83	162.46	0.83
16	Triderm	203.73	212.17	220.62	1.21
17	Celestoderm-V	252.58	276.37	300.16	1.58
18	Betaderm	143.42	171.76	200.10	0.98
19	Triacutan	179.80	183.44	187.09	1.05
20	Flucinar	150.90	161.94	172.98	0.92
21	Kremgen	168.05	174.22	180.40	0.99
22	Dekasan	130.68	150.44	170.20	0.86
23	Panthenol plus	73.82	80.21	86.60	0.45
24	Bepanthen plus	229.01	257.47	285.94	1.47
25	Rescuer	151.13	179.56	190.00	1.02
26	Furacilin	70.91	88.10	105.30	0.50
27	Braunodin	61.59	66.39	71.20	0.38
28	Iodadin	99.04	124.22	149.40	0.71
29	Povidone-iodine	139.39	150.69	162.00	0.86
<b>Lviv</b>					
1	Neomycin plus	89.66	96.78	103.90	0.55
2	Baneocin	198.45	237.22	276.00	1.36
3	Fuzikutan	189.45	197.42	205.40	0.55
4	Synthomycin	105.55	122.82	140.10	0.70
5	Levomycetin alcohol solution	14.93	20.96	27.00	0.12
6	Tyrozur	140.00	167.00	194.00	0.95
7	Bactroban	187.10	215.77	244.44	1.23
8	Sulfargin	411.79	422.19	432.60	2.42
9	Argosulfan	297.00	332.65	368.30	1.90
10	Streptocid ointment	32.40	43.95	55.50	0.25
11	Streptocid	16.30	19.4	22.50	0.11
12	Gyoxysone	105.13	115.73	126.23	0.66
13	Pimafucort	288.00	335.99	383.99	1.92
14	Oxycort	689.99	689.99	690.00	3.95
15	Belogent	114.83	134.01	153.20	0.76
16	Betazon ultra	129.20	146.70	164.20	0.84
17	Triderm	207.31	220.80	234.30	1.26
18	Celestoderm-V	193.57	220.93	248.30	1.26
19	Betaderm	124.15	157.92	191.70	0.90
20	Triacutane	174.69	189.2	203.71	1.08

continued table 4.2

1	2	3	4	5	6
21	Flucinar	147.80	161.85	175.91	0.92
22	Kremgen	165.00	179.7	194.40	1.03
23	Dekasan	111.95	136.12	160.30	0.78
24	Panthenol plus	102.00	108.9	115.80	0.62
25	Bepanten plus	234.00	271.9	309.80	1.55
26	Rescuer	159.31	183.80	208.30	1.05
27	Furacilin	79.47	104.48	129.50	0.59
28	Braunodin	60.33	65.76	71.20	0.37
29	Iodadin	114.52	138.79	163.06	0.79
30	Povidone-iodine	137.81	162.43	187.05	0.93
<b>Uzhhorod</b>					
1	Neomycin plus	100.18	102.04	103.90	0.58
2	Baneocin	200.00	236.7	273.40	1.35
3	Fuzikutan	196.50	209.89	223.28	1.20
4	Synthomycin	77.48	99.16	120.85	0.56
5	Levomycetin alcohol solution	21.94	24.04	26.14	0.13
6	Tyrozur	140.07	156.58	173.10	0.89
7	Bactroban	199.56	217.88	236.20	1.24
8	Sulfargin	411.79	422.19	432.60	2.42
9	Argosulfan	294.25	314.17	334.10	1.80
10	Streptocide ointment	35.20	48.50	61.80	0.27
11	Streptocide	15.30	19.60	23.90	0.11
12	Gyoxysone	109.69	117.34	125.00	0.67
13	Pimafucort	284.38	311.19	338.00	1.78
14	Belogent	120.62	136.91	153.20	0.78
15	Betazon ultra	133.62	141.81	150.00	0.81
16	Triderm	213.67	228.68	243.70	1.31
17	Celestoderm-V	268.95	308.36	347.78	1.76
18	Betaderm	124.50	166.31	208.12	0.95
19	Triacutan	179.30	187.6	195.90	1.07
20	Flucinar	149.28	173.74	198.20	0.99
21	Kremgen	167.05	179.51	192.00	1.02
22	Dekasan	121.42	147.56	173.70	0.84
23	Panthenol plus	103.62	110.81	118.00	0.63
24	Bepanten plus	236.00	282.33	328.66	1.61
25	Rescuer	156.02	185.81	215.60	1.06
26	Furacilin	79.47	95.78	112.10	0.54
27	Braunodin	62.51	62.51	62.51	0.35
28	Iodadin	101.26	152.40	152.40	0.72
29	Povidone-iodine	141.30	171.63	171.63	0.89

To visualize the dynamics of changes in coefficients for different local drugs in six selected cities, a multicomponent graph was constructed (Fig. 4.1). It was found that most antibacterial drugs are highly accessible.

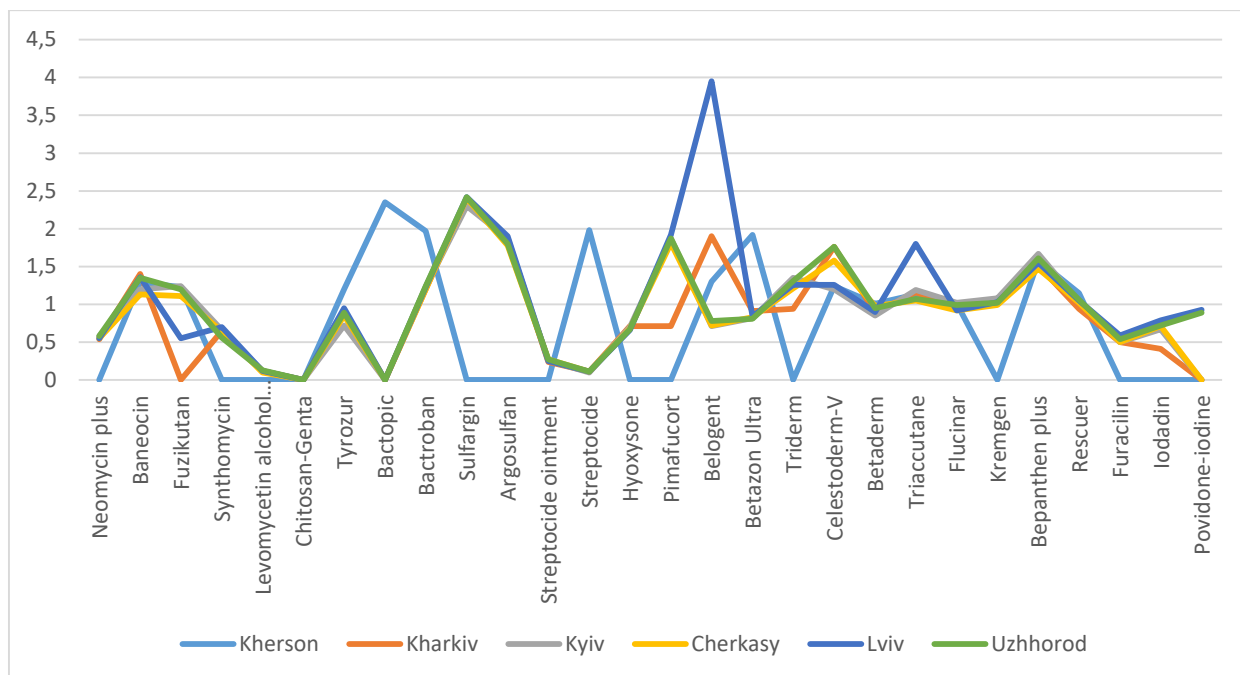


Figure 4.1 – Graph of changes in solvency adequacy ratios for LADs by city

However, it is worth noting that the calculations of K a.s were carried out in accordance with the available data on the average salary in Ukraine, which is not a median, and therefore does not reflect the real situation on the labor market in Ukraine. The latest data on the spread of average salaries by region (11 thousand UAH to 21 thousand) indicate that for different regions and cities antibacterial drugs may move to the categories of medium and low-access drugs

### **4.3 Development of recommendations for improving the Ukrainian pharmaceutical market of local antibacterial drugs and improving the quality of pharmaceutical care for patients suffering from pyoderma**

Based on the theoretical and practical research conducted to improve the management of the range of local antibacterial drugs and improve pharmaceutical

care, a number of measures are proposed, presented in the form of a structured scheme (Fig. 4.2).

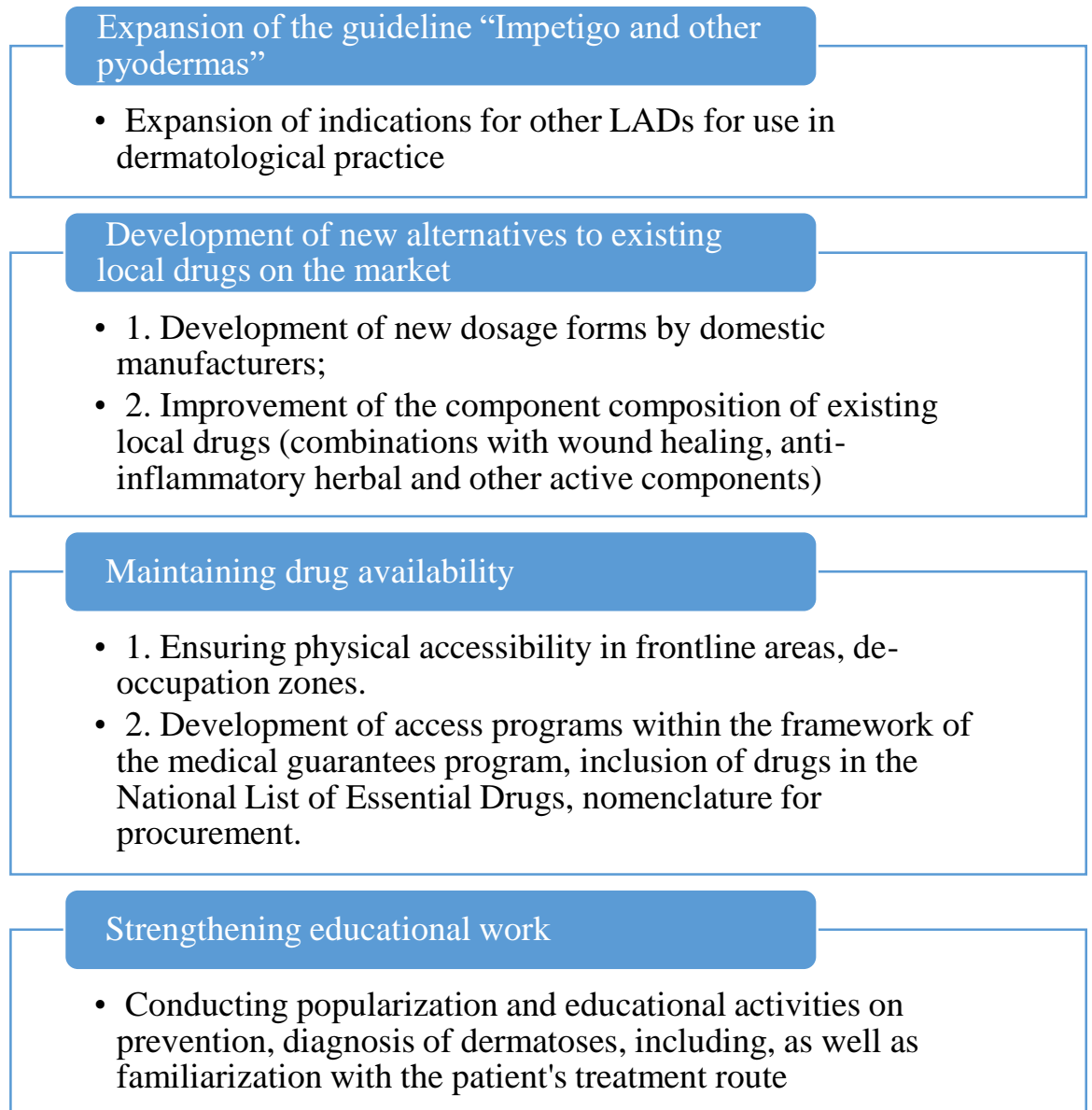


Figure 4.2 – Scheme for optimizing and improving pharmaceutical provision for patients suffering from dermatoses (pyoderma)

#### **Conclusion to Section 4.**

According to the results of the conducted research, it was found that the physical availability of local antibacterial drugs (by TN) in the cities of Ukraine is on average 82%. It was found that there is no difference in physical availability between the front-line, central and western regions.

The following were found to be unavailable for online ordering: cream "Bactafuz", cream "Fusiderm", gel "Chitosan-Genta", ointment "Bactopic", aerosol "Oxycort", cream "Bactafuz-B", solution "Braunodin".

According to the indicators of economic availability, 35 physically available antibacterial drugs (by trade names) were classified as highly accessible drugs. However, the spread of average wage indicators by region and the absence of its median value indicates that potentially all analyzed drugs can be classified as drugs of medium or low availability.

The need to optimize and improve the range of local drugs for the treatment of skin diseases, increase accessibility, and strengthen educational activities for children and women has been identified.

## CONCLUSIONS

The qualification work is dedicated to the investigation of the Ukrainian pharmaceutical market for topical antimicrobial agents used in the treatment of infectious skin diseases, with a particular focus on pyodermas (pyodermatitis).

1. Within the framework of the study, the main epidemiological indicators of skin diseases in Ukraine (prevalence and incidence) were identified, summarized, and analyzed. Data on the etiology, pathogenesis, and treatment of infectious skin diseases (pyodermas) were systematized and analyzed. It was determined that the primary causative agents of these conditions are bacteria and fungi.

2. Based on the conducted research, it was established that the market for antimicrobial agents is highly competitive, characterized by a large number of participants and a broad product range. Nevertheless, there remains a certain niche for the introduction of new products, particularly those that address current consumer needs and incorporate innovative technologies.

3. The study analyzed contemporary international standards for the use of medicinal products in the treatment of infectious dermatoses and systematized information on the range of medicines available for skin disease management. Among registered products, the subgroup D06 - antibiotics for topical use - accounts for 42.8% and is predominantly represented by single-component preparations; subgroup D07C - corticosteroids in combination with antibiotics for external use - constitutes 34.2%; and subgroup D08 - antiseptics and disinfectants - represents 21.05%.

4. It was determined that the predominant dosage form for topical antimicrobial agents used against pyodermas is cream, which accounts for 37% of all registered products in this category. The largest segment consists of two-component preparations with the combination «antibiotic + corticosteroid», which requires particular attention from domestic manufacturers due to the well-documented adverse effects of corticosteroids, especially in pediatric practice.

5. Analysis of the brand structure of the market revealed that foreign manufacturers dominate, holding the largest share of the product range by trade names. This situation represents an unfavorable factor for the development of the Ukrainian pharmaceutical sector.

6. The indicator of economic accessibility for physically available medicinal products was assessed across six cities in Ukraine and found to be within acceptable limits: 29 out of 35 products were classified as highly accessible.

7. Based on the obtained results, the following recommendations are proposed:

- In order to meet consumer needs and secure competitive advantages in the market, Ukrainian pharmaceutical manufacturers should actively implement innovative solutions and improve both the composition and dosage forms of topical antimicrobial agents.
- To enhance physical and economic accessibility across different regions of Ukraine, the healthcare system should refine clinical guidelines for the treatment of pyodermas and strengthen sanitary and health education efforts among the population.

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## MASTER'S THESIS

defended « \_\_\_\_\_ » \_\_\_\_\_ 2026 with a grade of \_\_\_\_\_

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