Management and Marketing of Circulation of First-Line Antituberculosis Medicines: Use of Innovative Research Technologies

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Abstract. The management and marketing of first-line antituberculosis medicines are paramount for the effective containment and treatment of tuberculosis, a global health challenge. Ensuring the optimal circulation of these medicines requires a seamless integration of supply chain management, demand forecasting, and strategic marketing. The introduction of innovative research technologies has transformed the landscape, offering enhanced methods for drug distribution, patient adherence, and efficacy tracking. Digital platforms harness data analytics to predict medicine demand more accurately, ensuring timely production and distribution, minimizing wastage, and optimizing resource allocation. Furthermore, innovative technologies such as blockchain can fortify the drug supply chain against counterfeits, ensuring that only genuine products reach end-users. On the marketing front, artificial intelligence-driven tools enable targeted awareness campaigns, providing personalized patient information and improving adherence to drug regimens. As tuberculosis treatment necessitates prolonged medication courses, ensuring patient compliance is crucial. Advanced research technologies assist in real-time monitoring of patient's drug intake, identifying potential drop-offs, and intervening timely. The main principles of pharmacotherapy of tuberculosis were presented in the article. Pharmaceutical marketing of anti-tuberculosis drugs was experimentally researched. The most promising manufacturers in terms of availability, quality, and demand for doctors, pharmacists, and patients were highlighted. In summary, innovative research technologies are indispensable in the modern management and marketing strategies of first-line antituberculosis medicines, fostering improved treatment outcomes, patient safety, and global tuberculosis containment efforts.

Keywords: management, marketing, circulation, evidence-based medicine, evidence-based pharmacy, tuberculosis, innovations, content analysis.

Introduction. Tuberculosis is one of the main threats to human health today. The weakening of the fight against this disease in many economically developed countries was premature and led to the situation getting out of control, as a result of which this disease has not been eliminated in the world [1, 2].

Tuberculosis is one of the most common infectious diseases caused by the bacterium Mycobacterium tuberculosis. It affects various organs, usually the lungs. Severe forms of the disease can be fatal. Risks increase against the background of covid, postcovid, long-covid, comorbid disorders, emergency situations. Pharmacotherapy of tuberculosis is based on a combination of drugs. Lasts for a period of time, usually six months to a year or more. The main goal is to eliminate disease-causing bacteria from the body and prevent the emergence of drug resistance. Effective treatment of tuberculosis requires regular administration of anti-tuberculosis drugs, adherence to recommendations regarding dosage and duration of administration, as well as monitoring of patients to assess treatment effectiveness and detect any adverse reactions [3-5].

Since tuberculosis is a global problem, the World Health Organization (WHO) is engaged in the development and implementation of programs and strategies to combat this disease. Provides

recommendations on the management, diagnosis, pharmacotherapy, prevention of tuberculosis, supports countries in implementing the necessary measures to control the disease [6].

It is important to pay attention to the early detection of tuberculosis, as this will contribute to successful treatment and prevent the spread of the disease. Other important aspects in the fight against tuberculosis are the improvement of living conditions, ensuring the availability of quality medical care for patients, pharmaceutical provision of anti-tuberculosis drugs, and reducing social exclusion of tuberculosis patients. These factors increase in the conditions of military conflicts [7]

Pharmacotherapy of tuberculosis patients is a complex process. Requires a lot of effort and coordination. However, with the help of proper treatment, resources, and efforts of specialists, achieving control over tuberculosis is possible [8].

The search for innovative technologies in pharmacotherapy in determining the balance of "supply and demand" for medicines of different clinical and pharmacological, classification and legal, nomenclature and legal groups is actual and necessary. Today it is important to use effective, quality, safe and available medicines for pharmacotherapy of tuberculosis. It is also important to use innovative technologies on the principles of evidence-based medicine, forensic pharmacy, evidence-based pharmacy, medical and pharmaceutical law [9-14].

The purpose of the study was to investigate the management and marketing of first-line antituberculosis drugs using innovative technologies.

Materials and methods. The term of the study was 2022-2023. The object of the study were anti-tuberculosis drugs of the I line, which are in circulation on the pharmaceutical market of Ukraine, approved for medical use, registered in the State Register of Drugs of Ukraine as of September 2023, and also included in the clinical instruction, standards of medical care "Tuberculosis" [15-19]. The authors worked out the principles of content analysis [20-24]. Content analysis is a widely used innovative method of analysis. There are three approaches to conduct content analysis: conventional, directed, and summative. All three approaches are used to interpret meaning from the content of text data and, hence, adhere to the naturalistic paradigm. The major differences among the approaches are coding schemes, origins of codes, and threats to trustworthiness. In conventional content analysis, coding categories are derived directly from the text data. With a directed approach, analysis starts with a theory or relevant research findings as guidance for initial codes. A summative content analysis involves counting and comparisons, usually of keywords or content, followed by the interpretation of the underlying context.

When conducting the experimental part of the study, the previously developed innovative proprietary method of content analysis was used for the first time for the circulation of drugs of all clinical and pharmacological, classification and legal, nomenclature and legal groups at the Department of Pharmaceutical and Medical Law, General and Clinical Pharmacy under the leadership of Professor V. Shapovalova [25-27].

The methodology for content analysis of the circulation of first-line antituberculosis drugs was based on theoretical principles of evidence-based medicine, forensic pharmacy, evidence-based pharmacy, medical and pharmaceutical law, clinical pharmacology, and pharmacotherapy. At the beginning of the study, the criteria for the selection of drugs were developed (Fig. 1).

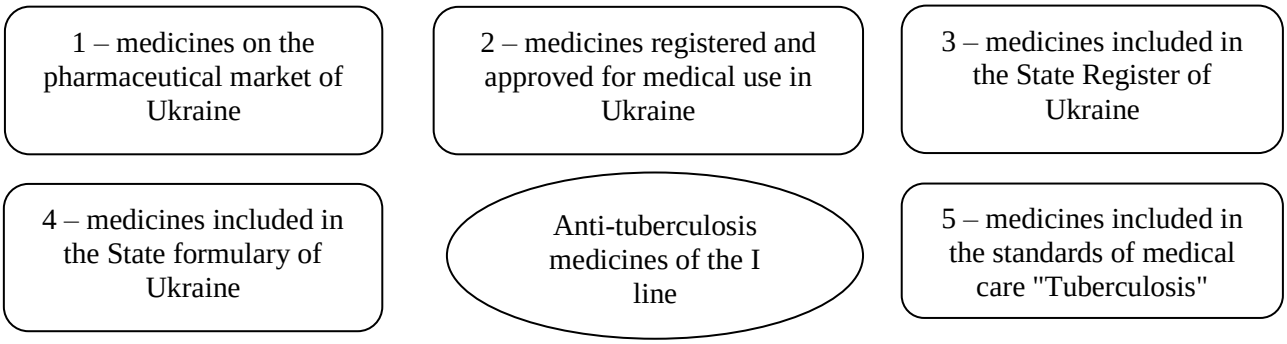

Fig. 1. Criteria for selection of first-line antituberculosis medicines for research.
Source: own development

The content analysis was carried out by grouping medicines according to the indicator of the medicine manufacturer. The indicator of grouping was understood as the country of the manufacturer of anti-tuberculosis medicines of the I line, the products of which are registered in Ukraine and meet the quality requirements [28].

It was performed according to the range of manufacturers by grouping them using the Sturgess formula, followed by construction of discrete line of variations and distribution polygon: n=1+3,322lg N, where n – is the number of groups; N – is the number of medicines.

The limits of the step of certain groups of medicines were determined by the following formula:

$$h = \frac{X\,max - Xmin}{n}$$

where h is the step size of the group; X_{max} – the maximum number of manufacturers; X_{min} – is the minimum value of the number of producers.

Among the additional research methods used are regulatory, documentary, clinical and pharmacological, marketing, forensic and pharmaceutical and graphic. Microsoft Excel 2010 (descriptive characteristics: minimum and maximum value, average value) was used to process the results and determine the consistency between the studied parameters.

The research of the article is a fragment of research works of Luhansk State Medical University “Conceptual interdisciplinary approaches to pharmaceutical provision and availability of drugs, taking into account organizational and legal, technological, analytical, pharmacognostic, forensic and pharmaceutical, clinical and pharmacological, pharmacoeconomic, marketing, social and economic competencies” (state registration number 0123U101632, terms 2023-2027); Kharkiv Medical Academy of Postgraduate Education on “Improving the organizational and legal procedure for providing patients with drugs from the standpoint of forensic pharmacy, organization and management of pharmacy” (state registration number 0116U003137, terms 2016-2020) and “Pharmaceutical and medical law: integrated approaches to the system of drug circulation from the standpoint of forensic pharmacy and organization of pharmaceutical business” (state registration number 0121U000031, terms 2021-2026); Petro Mohyla Black Sea National University on the topic “Conceptual interdisciplinary approaches to the drug circulation system, taking into account organizational and legal, technological, biopharmaceutical, analytical, pharmacognostic, forensic and pharmaceutical, clinical and pharmacological, pharmacoeconomic, pharmacotherapeutic aspects” (state registration number 0123U100468, implementation period 2023-2028).

Results and discussion. The goal of treatment of tuberculosis patients is to cure the disease with the maximum possible restoration of the body's condition, functions of the affected organ, work capacity, and improvement of the quality of life.

Pharmacotherapy.

In most cases, it is possible to cure tuberculosis (Fig. 2).

Treatment of tuberculosis patients depends on two interrelated factors:

- suppression of the mycobacterial population with the help of antituberculosis drugs;
- regression of tuberculous changes in affected organs and reparative processes in them.

Antimycobacterial pharmacotherapy is the main method of tuberculosis treatment. The therapeutic effect is due to the direct bactericidal or bacteriostatic effect of antituberculosis drugs on tuberculosis mycobacteria. Regression of tubercular changes in the affected organs and reparative processes in them also occur with the help of anti-tuberculosis drugs, as well as with the help of pathogenetic drugs that affect inflammation, regeneration processes or improve the tolerance of anti-tuberculosis chemotherapy.

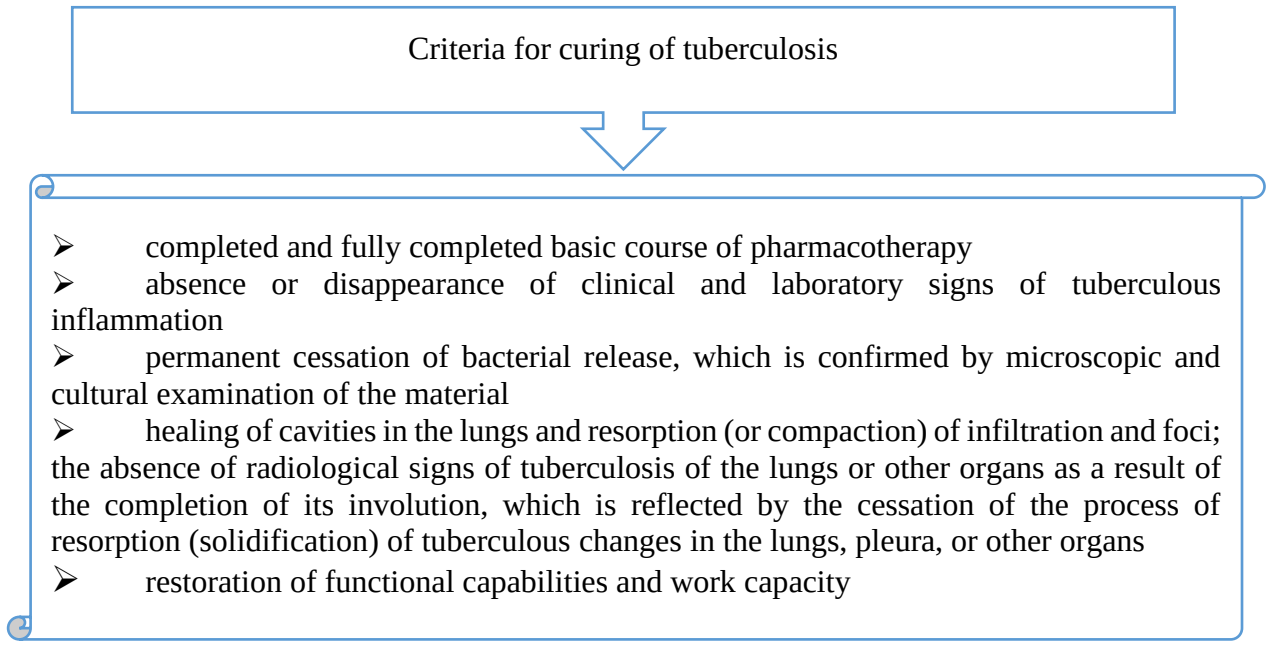

Fig. 2. Criteria for curing tuberculosis.

The main principles of anti-tuberculosis pharmacotherapy are shown on the Fig. 3.

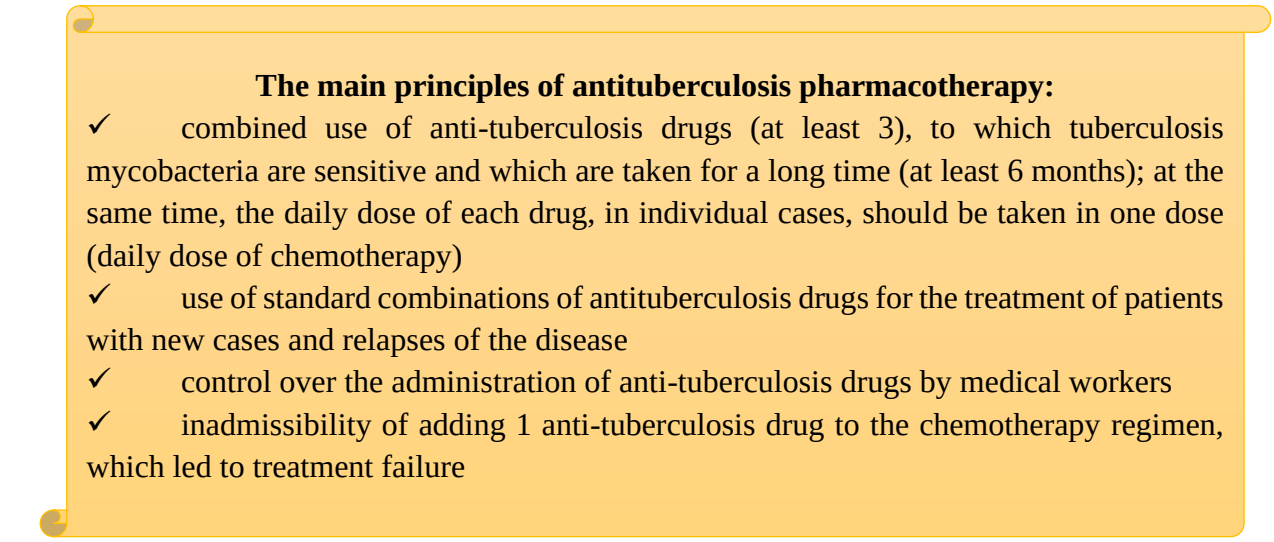

Fig. 3. The main principles of anti-tuberculosis therapy.

The main course of antituberculosis pharmacotherapy is divided into two stages (Table 1).

Table 1. Stages of the main course of antituberculosis pharmacotherapy.

Stage	Pharmacotherapy
The first stage – the intensive phase	used 4-5 anti-tuberculosis drugs with the aim of stopping the reproduction and significantly reducing the bacterial population of tuberculosis mycobacterium in the patient's body. The therapy carried out eliminates the manifestations of the disease, stops bacterial excretion and, in most patients, leads to the healing of cavities in the lungs
The second stage – the maintenance phase	2-3 anti-tuberculosis drugs used to ensure a stable clinical effect and to completely stop the reproduction of tuberculosis mycobacterium in the lesions to prevent exacerbation of the process

The method of treatment of patients with tuberculosis of the respiratory organs depends on the morphological changes in the lungs and the detection of tuberculosis mycobacteria in sputum. In patients with a destructive process and bacterial secretion, it is more intense compared to tuberculosis patients without bacterial secretion and destructive changes in the lungs (up to three months intensive phase, up to five months supportive phase).

Also, for the treatment of tuberculosis patients, other medicines are used as pathogenetic anti-inflammatory therapy, for the prevention and elimination of side effects of taking anti-tuberculosis medicines. As a pathogenetic anti-inflammatory medicine, glucocorticoids are used systemically, endobronchially, and intrapleurally (as an adjuvant therapy to reduce inflammatory changes of an exudative nature in the lungs, bronchi, edema of the brain and meninges, prevention of accumulation of exudate in the pleural cavity in pleurisy (after pleural puncture, accumulation of synovial fluid.

To eliminate side effects from anti-tuberculosis medicines, almost all classes of medicines are used, depending on the type of side effect that has developed (Table 2).

Table 2. Adverse reactions and clinical and pharmacological groups of medicines for their elimination.

Adverse reaction	Clinical and pharmacological group of medicines
Allergic reactions that can develop from any antituberculosis drug	Antihistamine medicines Glucocorticosteroids
Neurological side effects in the form of polyneuropathy, neuritis, CNS disorders, including psychoses, from isoniazid, aminoglycosides, ethambutol, cycloserine, ethionamide, prothionamide, fluoroquinolones	Vitamins Antiepileptic medicines Antipsychotic medicines Nootropic medicines Antidepressants
Dyspeptic manifestations that occur when taking most antituberculosis medicines, in the form of nausea, vomiting, diarrhea, heartburn, stomach pain	Antacids, proton pump inhibitors, peristalsis stimulators, antiperistaltic, antidiarrheal medicines, enzymes, antidiarrheal microbial medicines
Hepatotoxic reactions from isoniazid, rifampicin, pyrazinamide	Hepatotropic medicines Intravenous solutions
Hypothyroidism, which occurs when taking para-aminosalicylic acid, especially in combination with ethionamide, prothionamide	Hormonal medicines
Electrolyte imbalance (hypokalemia, hypomagnesemia) from the use of aminoglycosides	Mineral supplements Intravenous solutions
Pain in the joints when taking fluoroquinolones, pyrazinamide	Non-steroidal anti-inflammatory medicines

Medicines for the treatment of adverse reactions are used until the complete elimination of clinical and laboratory manifestations of adverse reactions. In the event of serious adverse reactions that are not eliminated by pathogenetic medicines, the anti-tuberculosis medicine that caused this adverse reaction is discontinued.

For the treatment of patients with tuberculosis, two groups of antimicrobial medicines are used: antituberculosis, antimicrobial (Table 3).

Table 3. Groups of antimicrobial medicines for pharmacotherapy of tuberculosis.

Group	Using
Anti-tuberculosis medicines	Exclusively for the treatment of patients with tuberculosis, include antibacterial agents, which, in addition to mycobacterium tuberculosis, also act on other pathogens.

	The selection of drugs into a separate group is due to the characteristics of the causative agent and the rapid development of resistance of mycobacterium tuberculosis to antimicrobial medicines during monotherapy. According to the indications for their appointment, antituberculosis medicines are divided into medicines of the I and II line.
Antibacterial medicines	Use fluoroquinolones, clarithromycin, amoxicillin/clavulanic acid, linezolid. II-IV generation fluoroquinolones have a bactericidal effect against tuberculosis mycobacteria. They are used in patients with multi-resistant tuberculosis. In case of isolation of strains resistant simultaneously to isoniazid and rifampicin – the main antituberculosis drugs. The effectiveness of the treatment of tuberculosis patients with the use of fluoroquinolones has been proven in randomized controlled trials (level of evidence A). Clarithromycin, amoxicillin/clavulanic acid, linezolid belongs to a group of drugs that WHO does not recommend for routine treatment of tuberculosis patients. These medicines are prescribed only in the case of extended resistance of tuberculosis mycobacteria (simultaneous resistance to isoniazid, rifampicin, aminoglycosides, fluoroquinolones), when it is not possible to include four anti-tuberculosis medicines together with fluoroquinolones in the pharmacotherapy regimen. The effectiveness of the treatment of tuberculosis patients with the use of clarithromycin, amoxicillin/clavulanic acid, linezolid has been proven in separate randomized controlled trials (level of evidence D).

The main principle of antimicrobial therapy in patients with tuberculosis is the combined use of antituberculosis medicines under the direct supervision of medical workers taking the drugs. The effectiveness of treatment of tuberculosis patients with the use of first and second line antituberculosis medicines has been proven in randomized clinical trials (level of evidence A).

First-line antituberculosis medicines are the main antituberculosis medicines that are prescribed to patients with newly diagnosed tuberculosis and relapses of the disease, which isolate sensitive Mycobacterium tuberculosis (patients of clinical categories I-III).

Antituberculosis medicines of the II line are reserve. Used only in individual schemes of pharmacotherapy in patients with tuberculosis of the IV category. Need to determine the drug resistance of tuberculosis mycobacteria to the I line of antituberculosis drugs. And also, among patients of other categories with resistance of tuberculosis mycobacteria to first-line medicines or their poor tolerance. The distribution of anti-tuberculosis medicines into medicines of the I and II line ensures compliance with standard schemes of tuberculosis chemotherapy to prevent the development of drug resistance of mycobacterium tuberculosis.

Pharmaceutical marketing

The international non-proprietary names of first- and second-line antituberculosis medicines are listed in the Table 4.

Table 4. International non-proprietary names of I and II line of antituberculosis medicines.

No.	Line	International non-proprietary name
1.	**I**	Isoniazid
2.		Rifampicin
3.		Rifabutin
4.		Pyrazinamide
5.		Ethambutol

6.		Streptomycin
7.	**II**	Kanamycin
8.		Amikacin
9.		Ethionamide
10.		Protionamide
11.		Sodium aminosalicylate
12.		Capreomycin
13.		Cycloserine
14.		Terizidone

First-line antituberculosis medicines were selected as primary data for content analysis. Allowed for circulation on the territory of Ukraine. According to the State Register of Drugs of Ukraine, as of September 2023, they were registered and approved for circulation in healthcare facilities. After summarizing the processed data, a list of the I line of antituberculosis medicines was compiled. There are 41 names (Table 5).

Table 5. List of the I line of antituberculosis medicines.

No.	Trade name/Manufacturer/Country	Dosage form, weight, amount per unit
1.	Ethambutol hydrochloride / Kadila Pharmaceuticals Limited, India	Coated tablets 400 mg
2.	R-CYN / Lupine Limited, India	Capsules 150 mg; 300 mg
3.	Rifabutin / Lupine Limited, India	Capsules 150 mg
4.	Rifabutin 150 / Lupine Limited, India	Capsules 150 mg
5.	Payzina / Lupine Limited, India	Tablets 500 mg
6.	Rifampin / Mylan laboratories limited - Sterile Medicines Division, India	Powder is lyophilized to prepare a solution for infusions 600mg
7.	Rifampin / Mylan Laboratories limited - Sterile Medicines Division, India	Powder for preparation of solution for injections 600 mg
8.	Isoniazid / McLeods Pharmaceuticals Limited, India	Tablets 100 mg, 300 mg
9.	Macox 150 / McLeods Pharmaceuticals Limited, India	Capsules 150 mg
10.	Macox 150 / McLeods Pharmaceuticals Limited, India	Capsules 150 mg
11.	Macox 300 / McLeods Pharmaceuticals Limited, India	Capsules 300 mg
12.	Macox 300 / McLeods Pharmaceuticals Limited, India	Capsules 300 mg
13.	Macrozid 500 / McLeods Pharmaceuticals Limited, India	Tablets 500 mg
14.	Ekoks 400 / McLeods Pharmaceuticals Limited, India	Tablets 400 mg
15.	Ethambutol dispersible tablets 100 MG / McLeods Pharmaceuticals Limited/Oxalis Labs, India/India	Tablets 100 mg
16.	Isoniazid / Micro Labs Limited, India	Tablets 100 mg
17.	Isoniazid / Micro Labs Limited, India	Tablets 300 mg
18.	Pyrazinamide / Micro Labs Limited, India	Tablets 150 mg
19.	Pyrazinamide / Micro Labs Limited, India	Tablets 500 mg
20.	Streptomycin / PJSC "Kyivmedpreparat", Ukraine	Powder for preparation of solution for injections 500 mg

21.	Streptomycin / PJSC "Kyivmedpreparat", Ukraine	Powder for preparation of solution for injections 1000 mg
22.	Isoniazid - Darnytsa / PrJSC "Pharmaceutical firm "Darnytsia", Ukraine	Tablets 300 mg
23.	Isoniazid - Darnytsa / PrJSC "Pharmaceutical firm "Darnytsia", Ukraine	Tablets 300 mg
24.	Isoniazid - Darnytsa / PrJSC "Pharmaceutical firm "Darnytsia", Ukraine	Solution for injections 100 mg/ml
25.	Pyrazinamid - Darnytsa / PrJSC "Pharmaceutical firm "Darnytsia", Ukraine	Tablets 500 mg
26.	Ethambutol / PrJSC "Pharmaceutical firm "Darnytsia", Ukraine	Tablets 400 mg
27.	Rifampicin / Public joint-stock company "Scientific and production center "Borshchagiv chemical and pharmaceutical plant", Ukraine	Capsules 150 mg
28.	Rifampicin / Public joint-stock company "Scientific and production center "Borshchagiv chemical and pharmaceutical plant", Ukraine	Capsules 150 mg
29.	Isoniazid / Public joint-stock company "Scientific and production center "Borshchagiv chemical and pharmaceutical plant", Ukraine	Tablets 100 mg
30.	Isoniazid / Public joint-stock company "Scientific and production center "Borshchagiv chemical and pharmaceutical plant", Ukraine	Tablets 200 mg
31.	Pyrazinamide /Public joint-stock company "Scientific and production center "Borshchagiv chemical and pharmaceutical plant" (full-cycle production) / Limited liability company "Agropharm" (production, packaging, production of line) / Limited liability company, Ukraine / Ukraine	Tablets 500 mg
32.	Ethambutol / Public joint-stock company "Scientific and production center "Borshchagiv chemical and pharmaceutical plant", Ukraine	Tablets 400 mg
33.	Ethambutol / Public joint-stock company "Scientific and production center "Borshchagiv chemical and pharmaceutical plant", Ukraine	Tablets 400 mg
34.	Ethambutol / Swizera labs private limited, India	Tablets 400 mg
35.	Bitube / LLC "Yuriya-Pharm", Ukraine	Solution for injections 100 mg/ml
36.	Bitube / LLC "Yuriya-Pharm", Ukraine	Solution for injections 100 mg/ml
37.	Isoniazid / LLC "Yuriya-Pharm", Ukraine	Syrup 100mg/5ml
38.	Inbutol / LLC "Yuriya-Pharm", Ukraine	Solution for injections 100 mg/ml
39.	Inbutol / LLC "Yuriya-Pharm", Ukraine	Solution for injections 100 mg/ml
40.	Inbutol / LLC "Yuriya-Pharm", Ukraine	Concentrate for solution for infusions 100 mg/ml
41.	Inbutol / LLC "Yuriya-Pharm", Ukraine	Concentrate for solution for infusions 100 mg/ml

Content analysis technology

For the content analysis, the studied medicines were divided in accordance with the indicator for calculating the number of countries of manufacture. Primary data was selected and processed (Table 6).

Table 6. Primary data for content analysis by manufacturers.

No.	Manufacturer	Quantity
1.	Swizera labs private limited, India	1
2.	Kadila Pharmaceuticals Limited, India	1
3.	PJSC "Kyivmedpreparat", Ukraine	2
4.	Mylan Laboratories Limited, India	2
5.	Micro Labs Limited, India	4
6.	Lupine Limited, India	4
7.	PrJSC "Pharmaceutical firm "Darnytsia", Ukraine	5
8.	LLC "Yuriya-Pharm", Ukraine	7
9.	Public joint-stock company "Scientific and production center "Borshchagiv chemical and pharmaceutical plant", Ukraine	7
10.	McLeods Pharmaceuticals Limited, India	8
	Total	**41**

Data from the Table 6 shows that the products of ten manufacturers are in circulation in healthcare institutions. The number of names of medicines of these manufacturers is from one to eight items.

When calculating the number of medicines produced by various pharmaceutical manufacturers, the number of groups was determined: n=1+3,322lgN=1+3,322lg10=4,322. We accept n=4 groups. The step of the group is defined.

$$h = \frac{(8-1)}{4} = 1{,}75$$

We take h=2.

The distribution of steps according to the groups is indicated in the Table 7.

Table 7. Determination of the step limit of groups when summarizing by manufacturers.

Group No.	Initial pitch value	Final pitch value
1	0	2
2	3	4
3	5	6
4	7	8

Source: own development

According to the calculations, the studied anti-tuberculosis medicines of the I line were divided by ten manufacturers into four groups (Table 8).

Table 8. Manufacturer and number of names of anti-tuberculosis medicines of the I line.

No.	Manufacturer	Number of names of medicines
The 1st group		
1.	Swizera labs private limited, INDIA	1
2.	Kadila Pharmaceuticals Limited, India	1
3.	PJSC "Kyivmedpreparat", Ukraine	2

4.	Mylan Laboratories Limited, India	2
	Total	**6**
The 2nd group		
1.	Micro Labs Limited, India	4
2.	Lupine Limited, India	4
	Total	**8**
The 3rd group		
1.	PrJSC "Pharmaceutical firm "Darnytsia", Ukraine	5
	Total	**5**
The 4th group		
1.	LLC "Yuriya-Pharm", Ukraine	7
2.	Public joint-stock company "Scientific and production center "Borshchagiv chemical and pharmaceutical plant", Ukraine	7
3.	McLeods Pharmaceuticals Limited, India	8
	Total	**22**

Source: own development

Based on the data obtained in the Table 8, we can analyze the pharmaceutical market by manufacturers. The first group included one domestic manufacturer and three foreign manufacturers in the range from zero to two items. So, four manufacturers and six medicines were included in this group. The range of the second group included two foreign manufacturers of anti-tuberculosis medicines of the I line and eight names. Based on the data in the Table 4, the third group included one domestic manufacturer of medicines – PrJSC "Pharmaceutical firm "Darnytsia", five items. The fourth group included two domestic and one foreign manufacturer. In the range from seven to eight items and there were 22 drugs. These manufacturers provide economically affordable anti-tuberculosis medicines of the I line.

Based on the content analysis of medicines by manufacturers and by quantitative indicator, statistical processing of the research results was carried out by constructing discrete variation line and distribution polygons of the obtained data. Discrete variation line of drugs distribution is presented in the Table 9.

Table 9. Discrete variation line.

Group No.	Range of the group	Frequency, f_i
1	0-2	6
2	3-4	8
3	5-6	5
4	7-8	22

Source: own development

The discrete variational line is an ordered distribution of units of the studied population into groups (according to the results of grouping using the Sturges formula), according to a certain variable characteristic (the number of anti-tuberculosis drugs of the I line). The obtained discrete variation line of the distribution of medicines indicates that the studied quantitative indicator of manufacturers fluctuates within the fourth group (range from seven to eight) with the highest frequency (f_i=22).

Graphically discrete variation line of the studied medicines is presented in the form of a distribution polygon (Fig. 4).

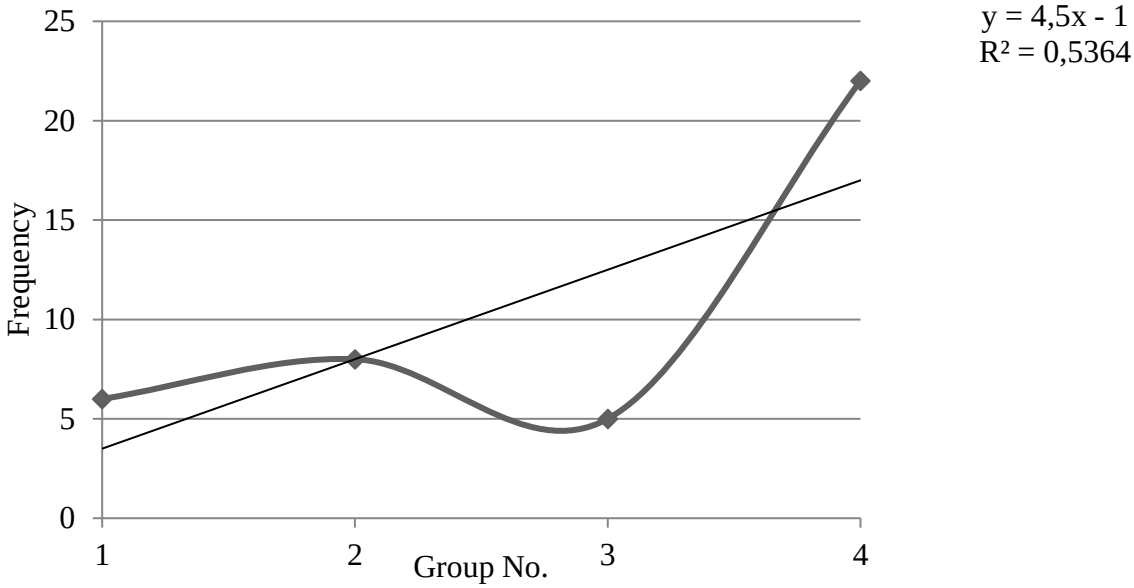

Fig. 4. Polygon distribution range of investigated anti-tuberculosis medicines of the I line by manufacturers.
Source: own development

So, we have four groups of investigated medicines by manufacturers (Fig. 4). The first group included four manufacturers. Six anti-tuberculosis medicines of the I line are produced. The second group includes two foreign manufacturers. Eight names of medicines are produced. The third group includes one domestic manufacturer PrJSC "Pharmaceutical firm "Darnytsia". It produces five types of medicines. The fourth group includes two domestic and one foreign manufacturer. They produce a total of 22 medicines. The 4th group enjoys the greatest demand. Social orientation of the study: manufacturers from with the number of titles four and more (the second, third and fourth groups) are economically available for patients and health care institutions.

Conclusion. The management and marketing of first-line antituberculosis drugs with the use of innovative technologies were studied. The risks of the spread of tuberculosis against the background of emergency situations, covid, postcovid, long-covid, comorbid disorders are proven. The innovative method of content analysis developed for the first time was used for the circulation of drugs of all clinical and pharmacological, classification and legal, nomenclature and legal groups. Five criteria for the selection of first-line antituberculosis medicines have been developed.

The content analysis methodology was described. The main principles of pharmacotherapy of tuberculosis were presented. Pharmaceutical marketing of anti-tuberculosis drugs was experimentally investigated. A list of 41 drugs was compiled. An innovative technology of content analysis for the circulation of first-line antituberculosis drugs is described. Four groups of drugs by manufacturers were obtained and described in detail. The most promising manufacturers in terms of availability, quality, and demand for doctors, pharmacists, and patients were highlighted.

Conflict of interests. The authors confirm that they are the authors of this work and have approved it for publication. The authors also certify that the obtained data and research were conducted in compliance with the requirements of moral and ethical principles based on medical and pharmaceutical law, and in the absence of any commercial or financial relationships that could be interpreted as a potential conflict of interest.

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