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SURGICAL CLINIC FOR THE TREATMENT OF TUBERCULOUS EXUDATIVE PLEURISY: AVAILABILITY OF ANTI-TUBERCULOSIS MEDICINES

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Introduction

Tuberculous exudative pleurisy remains a serious challenge for the surgical clinic, particularly under conditions of limited resources, migration, and disruptions to pharmaceutical supply chains. The low specificity of the clinical course, minimal bacterial shedding, and the need for invasive verification methods (thoracoscopy, video-thoracoscopy) lead to diagnostic delays [1, 2].

The surgical clinic for treating tuberculous exudative pleurisies is based on anti-tuberculosis pharmacotherapy, the effectiveness of which depends not only on the pharmacodynamics and pharmacokinetics of the drugs, but also on the stability of supply of specific dosage forms, strengths, and fixed-dose combinations. Logistics disruptions force surgeons to make compelled substitutions, threatening the effectiveness of standard regimens for the intensive phase (4 drugs) and continuation phase (2 drugs) of therapy lasting 4-6 months [3].

The COVID-19 pandemic, post-COVID conditions, comorbidities (HIV, diabetes mellitus, chronic liver and pancreatic diseases), mental disorders, and addictions have exacerbated the risks of underdiagnosis, treatment interruptions, and the development of drug resistance. In the structure of extrapulmonary tuberculosis, pleural forms account for a significant proportion (78.8-98% of respiratory forms), as confirmed by clinical-epidemiological data [4].

The clinical technology based on content analysis in surgical practice enables resource provision by systematizing scattered information on anti-tuberculosis medicines (trade names, manufacturers, dosage forms, strengths, fixed-dose combinations, supply stability) and linking it to the surgical hospital's real needs. Unlike traditional reviews, this technology transforms text arrays (instructions, registration dossiers, clinical guidelines) into structured parameters that form the basis for managerial decisions on assortment formation, procurement priorities, and drug substitution protocols.

In the surgical clinic, treatment success is determined by adherence to international and national clinical protocols, treatment standards, and formularies, and by the ability to implement a complete standard regimen without interruption. Clinical challenges include regimen hepatotoxicity, drug interactions (especially rifampicin), the need for long-term pharmacotherapy monitoring, and the use of adjuvant glucocorticoids for pleural forms. Therefore, the clinical technology based on content analysis in surgery enables digitization of the actual assortment of anti-tuberculosis medicines by manufacturers, dosage forms, strengths, fixed-dose combinations, and supply stability. This manufacturer-oriented analysis determines whether a specific surgical hospital or region can implement a full standardized regimen without compelled substitutions or interruptions, ensuring therapy adherence and safety.

The aim of study - to assess, using clinical technology based on content analysis, the availability of anti-tuberculosis medicines on the Ukrainian pharmaceutical market to ensure continuous pharmacotherapy for patients with tuberculous exudative pleurisy in surgical clinics.

Materials and methods

The study period is 2022-2026. Object of the study: Anti-tuberculosis medicines circulating on the Ukrainian pharmaceutical market and available to support pharmacotherapy for patients with tuberculous exudative pleurisy in surgical hospitals.

Clinical technology based on content analysis

The study has an analytical and review nature, employing principles of evidence-based medicine, evidence-based pharmacy, clinical-pharmacological analysis, and clinical technology based on content analysis tailored to the needs of surgical services. The results do not substitute clinical trials and are not direct recommendations for individual treatment regimens. This clinical technology provides surgeons with structured information for optimal planning of continuous anti-tuberculosis therapy for pleural forms.

The analysis included international and national clinical guidelines for the treatment of tuberculous exudative pleurisy, medical care standards, instructions for medical use and registration dossiers of anti-tuberculosis medicines, the State Register of Medicines of Ukraine, trade names, dosage forms, and strengths [5-12].

Manufacturer-oriented analysis for surgical practice

When conducting the experimental part of the study, the authors of the article used an innovative proprietary method of content analysis for the circulation of drugs of various clinical-pharmacological, classification-legal, nomenclature-legal groups [13-17].

Methodology for conducting content analysis of circulation of antituberculosis medicines was based on theoretical principles of evidence-based medicine, evidence-based pharmacy, medical and pharmaceutical law, clinical pharmacology, and pharmacotherapy.

At the beginning of the study, criteria for the selection of drugs were developed (Fig. 1).

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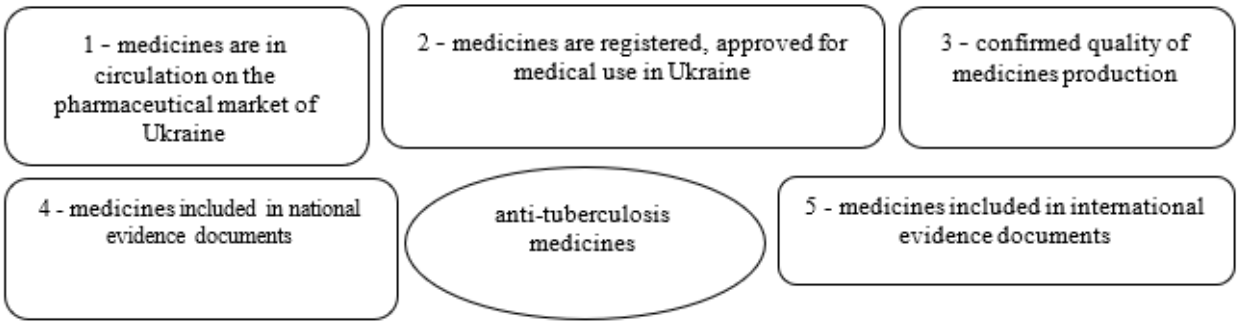

Fig. 1. Selection criteria for antituberculosis medicines for research

Criteria for selecting anti-tuberculosis drugs for the surgical clinic

- criterion 1 - availability in circulation on the pharmaceutical market of Ukraine, actual availability on the pharmaceutical market in the study period 2022-2026;
- criterion 2 - state registration and permission for medical use in Ukraine, current instructions in Ukrainian;
- criterion 3 - confirmed production quality Good Manufacturing Practice (GMP), valid manufacturer GMP compliance: European Union Good Manufacturing Practice (EU GMP), Pharmaceutical Inspection Co-operation Scheme (PIC/S);
- criterion 4 - inclusion in national evidence documents (clinical guidelines, standards, protocols, State formulary);
- criterion 5 - compliance with international guidelines of the World Health Organization (WHO), American Thoracic Society (ATS), Centers for Disease Control and Prevention (CDC), European Respiratory Society (ERS), and Infectious Diseases Society of America (IDSA) as anti-tuberculosis drugs.

Content analysis was carried out by grouping medicines by the indicator related to their manufacturers. The grouping indicator was understood as the country of origin of antituberculosis medicine, whose products are registered in Ukraine and meet quality requirements.

Content analysis of medicines was performed according to the range of manufacturers by grouping them using the Sturgess formula, followed by the construction of a discrete series of variations and a 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 formula:

,

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 statistics: minimum, maximum, and average values) was used to process the results and assess the consistency among the studied parameters.

Limitations of the subject of research.

The study does not evaluate clinical efficacy, pharmacoeconomic feasibility, or treatment outcomes and is limited to the inventory and structuring of the assortment of first-line antituberculosis medicines by manufacturer. The analysis is based on data from Ukraine's pharmaceutical market for the period 2022-2026 and reflects the regulatory and logistical conditions specific to this setting.

The obtained results do not replace clinical trials and cannot be interpreted as direct clinical recommendations for individual treatment regimens for pleural forms of tuberculosis. The manufacturer-oriented content analysis serves as an applied management tool to support formulary decisions, local protocols, and procurement planning, and should be used in combination with evidence-based clinical guidelines and prospective clinical data.

The study of the article is a fragment of research works of Private Scientific Institution "Scientific and Research University of Medical and Pharmaceutical Law" and Danylo Halytsky Lviv National Medical University on the topic "Diagnosis, treatment, pharmacotherapy of inflammatory, traumatic and onco-thoracic pathology using instrumental methods" (state registration number 0125U000071, implementation period 2025-2031); Private Scientific Institution "Scientific and Research University of Medical and Pharmaceutical Law" and Scientific Research Establishment of Innovations for Future LLC USA on the topic “Multimodal research on innovative legal, medical and pharmaceutical, clinical and pharmacological, behavioral-cognitive, psychological, socio-economic, medical and technological, forensic and pharmaceutical, and digital strategies for patient-centered pharmacotherapy of PTSD and associated diseases in war and conflict settings” (state registration number 0125U003297, implementation period 2025-2029).

Results and discussion

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Content analysis is a widely used innovative method of analysis. There are three approaches to conducting content analysis: conventional, directed, and summative. All three approaches are used to interpret meaning from 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.

The approach chosen by the authors to the content analysis of antituberculosis medicines in the treatment of pleural forms of tuberculous exudative pleurisy is methodologically consistent with publications where structured analysis of textual information (instructions, leaflets, pharmacological surveillance messages) is used to assess the quality of drug information and pharmacotherapeutic decisions [18-20].

In contrast to these works, the content analysis of the authors of this article is focused on the range and manufacturers of antituberculosis medicines, which allows for direct linking of the results obtained with the management of availability, safety, and rational use of basic treatment regimens for pleural forms of tuberculous exudative pleurisy, and to implement a manufacturer-oriented approach.

In this context, content analysis serves as an evidence-based tool for systematizing information about drugs, enabling the translation of scattered textual information for each drug (indications, dosage regimens, available dosage forms, age restrictions, data on efficacy and safety, pharmacokinetic features) into structured parameters. Thus, the evidence-based treatment of tuberculous exudative pleurisy increases transparency, justification, and consistency of decisions regarding the range of antituberculosis medicines with the modern evidence base.

Clinical perspective

Treatment of tuberculous exudative pleurisy is based on the use of anti-tuberculosis drugs with proven effectiveness, which are prescribed for a long period (usually at least six months). The main group is anti-tuberculosis drugs (Isoniazid, Rifampicin, Pyrazinamide, Ethambutol), the effectiveness of which has been confirmed by randomized controlled trials and reflected in modern international and national clinical guidelines. It is they who bear the main burden of curing most patients.

In a previous study, a correlation was found between tuberculous exudative pleurisy of a different origin. All patients underwent a comprehensive clinical evaluation comprising laboratory, X-ray, and instrumental examinations. It was concluded that tuberculous exudative pleurisy is the most common nosology among various forms of pathologies of extrapulmonary tuberculosis (from 78.8% to 98% of cases of respiratory tuberculosis). Other publications have investigated organizational and resource support for clinical decisions by ABC and VED analysis. However, content analysis is used in this work for the first time as a tool for selecting anti-tuberculosis drugs.

The spread of tuberculosis in the Lviv region, according to the state institution "Lviv Regional Center for Disease Control and Prevention of the Ministry of Health," is shown in Fig. 2 and Fig. 3.

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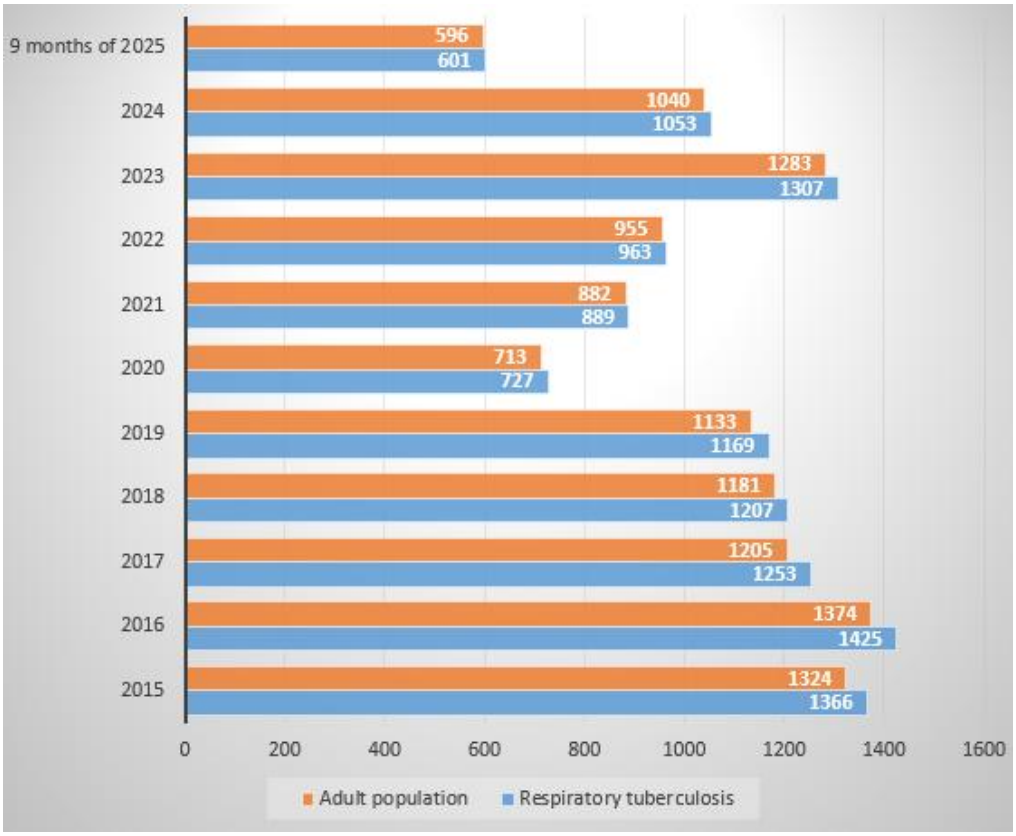

Fig. 2. The spread of tuberculosis among the adult population in the Lviv region according to the state institution "Lviv Regional Center for Disease Control and Prevention of the Ministry of Health"

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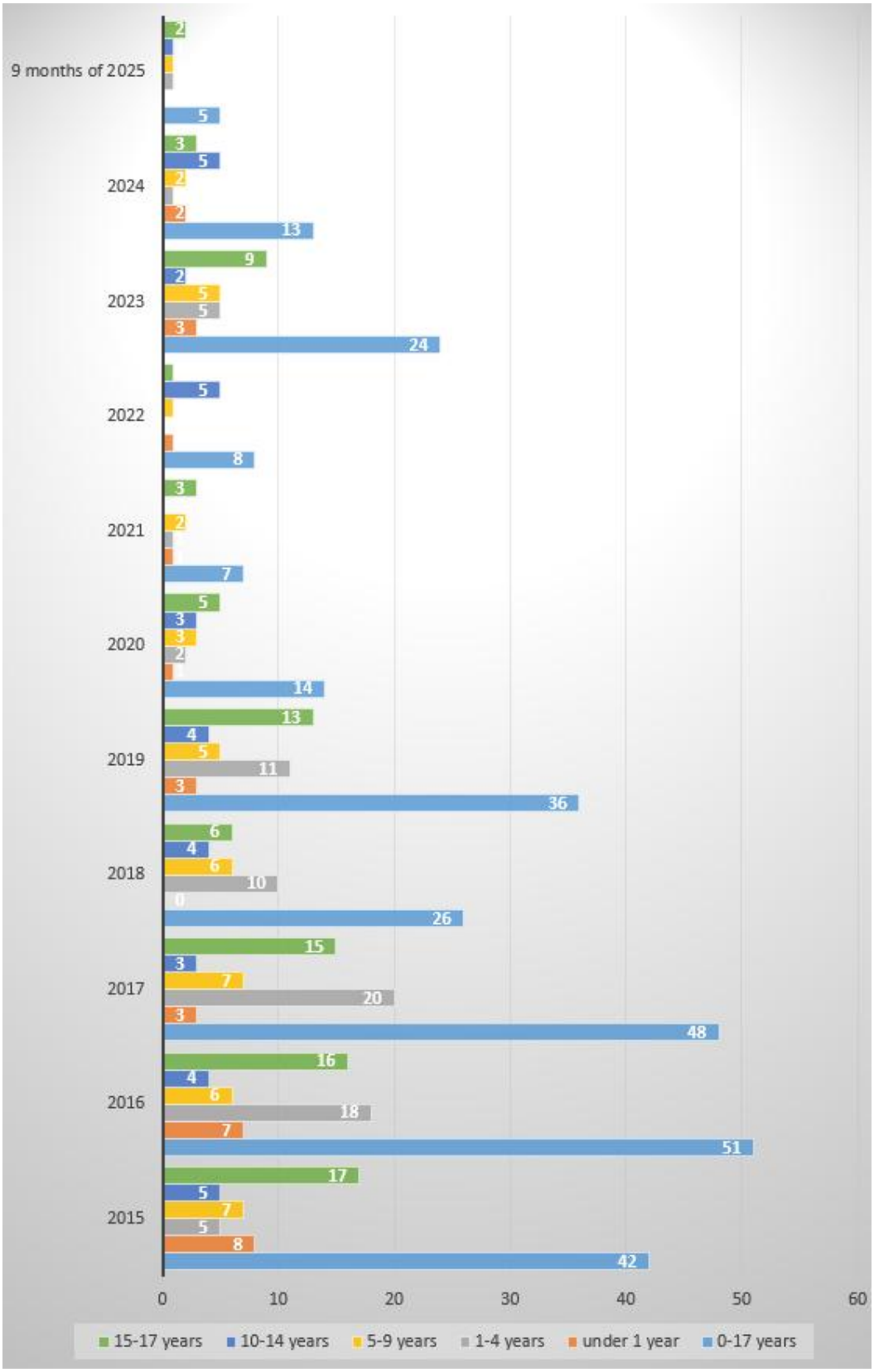

Fig. 3. Spread of tuberculosis among persons 0-17 years old in Lviv region according to the state institution "Lviv Regional Center for Disease Control and Prevention of the Ministry of Health"

Indicators of cure of pleural forms of tuberculosis (pleurisy and empyema) are shown in Fig. 4.

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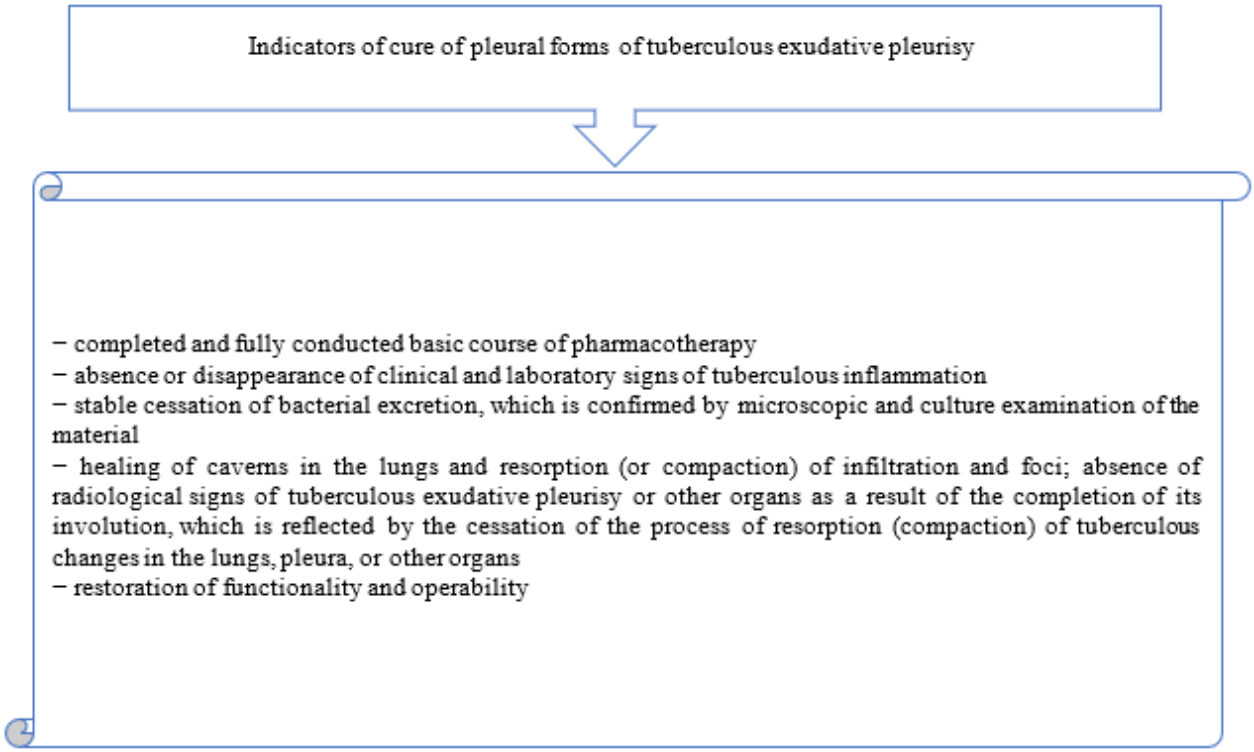

Fig. 4. Indicators of cure of pleural forms of tuberculous exudative pleurisy

These care indicators emphasize that the effectiveness of treatment for tuberculous exudative pleurisy is determined not only by the pharmacological properties of antituberculosis medicines but also by the organizational capacity to ensure uninterrupted standard regimens, appropriate dosage forms and strengths, and timely substitutions in the event of supply disruptions.

In this context, the results of the manufacturer-oriented content analysis directly link clinical outcomes with real supply capabilities, demonstrating that continuity of pharmacotherapy and the availability of alternative manufacturers and dosage forms are critical prerequisites for achieving stable cure indicators in patients with pleural forms of tuberculosis.

Rationally planned antimycobacterial pharmacotherapy with antituberculosis medicines is a fundamental approach to treating tuberculous exudative pleurisy and is considered in this work a key element of treatment regimens. The therapeutic effect is due to direct bactericidal or bacteriostatic activity against Mycobacterium tuberculosis, which helps control the infectious process and prevent its progression. Regression of pleural and parenchymal changes occurs against the background of a full course of chemotherapy with first-line drugs and is complemented by pathogenetic therapy aimed at modulating inflammation, maintaining treatment, and improving treatment tolerability. Together, this forms evidence-based, organizationally driven management of pleural forms of tuberculosis, with an emphasis on continuity of courses, proper selection of forms and doses, and readiness for safe substitutions in case of supply interruptions.

Pharmacokinetic features of pleural forms of tuberculous exudative pleurisy

For tuberculous exudative pleurisy, the penetration of antituberculosis medicines into the pleural fluid is fundamental. It has been shown that individual drugs, primarily rifampicin and pyrazinamide, can achieve lower concentrations in the pleural space than in plasma. This increases the risk of "functional monotherapy," resistance selection, and clinical failure. Hence, the need for organizationally controlled provision of exactly those forms, dosages, and fixed combinations (Isoniazid, Rifampicin, Pyrazinamide, Ethambutol).

Such schemes allow you to implement full-fledged intensive and maintenance phases of therapy without interruption, considering the availability of pediatric, low-dose options.

The identified imbalance in drug penetration is a separate argument for a prospective clinical study of standard first-line regimens in pleural localizations, considering Therapeutic Drug Monitoring as a tool to optimize dosing and increase the frequency of successful clinical responses.

The basic principles of treatment of tuberculous exudative pleurisy are shown in Fig. 5.

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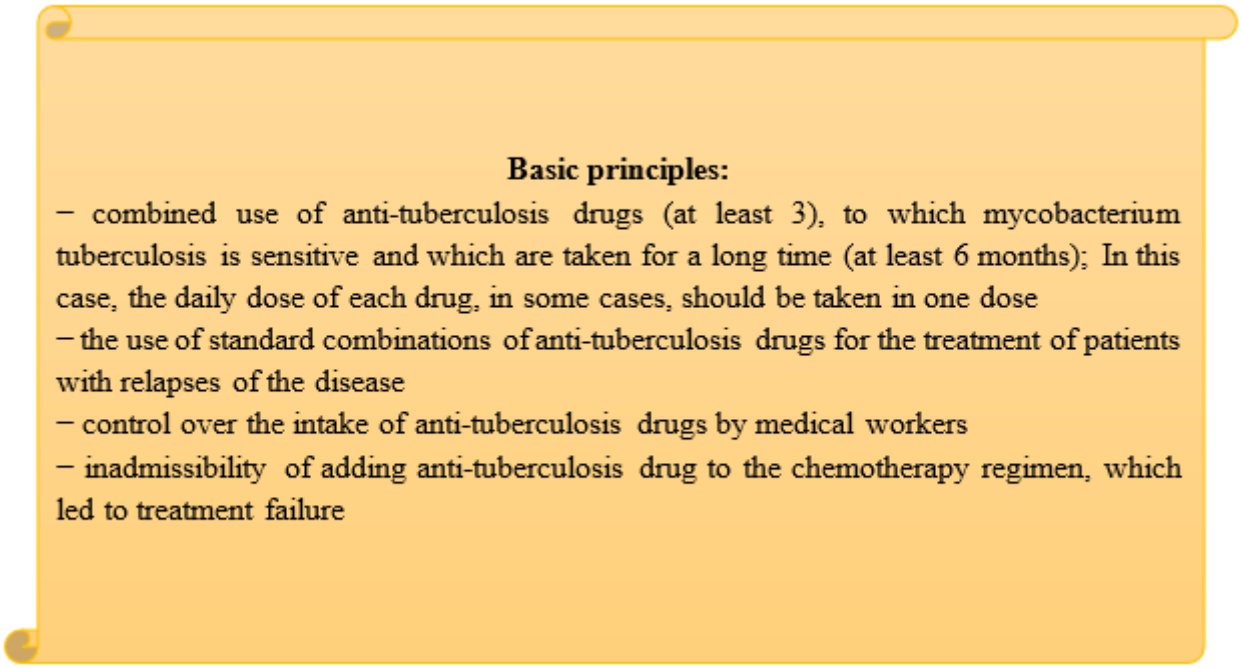

Fig. 5. Basic principles of treatment of tuberculous exudative pleurisy\

These basic principles highlight that the effective implementation of standard regimens for tuberculous exudative pleurisy extends beyond pharmacological correctness and depends on programmatic feasibility, including the availability of appropriate dosage forms, strengths, fixed-dose combinations, and alternative manufacturers.

From a manufacturer-focused content analysis perspective, the combined use of anti-tuberculosis medicines, uninterrupted regimens, and adherence monitoring requires a complete and stable manufacturer portfolio, thereby demonstrating the practical value of the proposed analytical approach.

The main course of treatment of tuberculous exudative pleurisy is divided into two stages (Table 1).

Table 1. Stages of the main course of pharmacotherapy of tuberculous exudative pleurisy

Stage	Pharmacotherapy
The first stage is the intensive phase	A rationally combined scheme of 4-5 anti-tuberculosis drugs is used to quickly inhibit the reproduction of Mycobacterium tuberculosis and minimize the bacterial population in the patient's body. At this stage, relief of the main clinical manifestations of pleural forms of tuberculosis (pleurisy and empyema) is achieved, cessation or significant decrease in bacterial excretion, and, in the presence of pulmonary lesions, the onset of cavity healing and regression of infiltrative changes.
The second stage is the maintenance phase	2-3 anti-tuberculosis drugs are used to consolidate the achieved clinical effect, complete eradication of persistent Mycobacterium tuberculosis in lesions, prevention of exacerbation of the process, recurrence of pleural forms of tuberculous exudative pleurisy, and progression of pulmonary changes. At this stage, treatment management is focused on completing the full course of therapy, monitoring tolerability, and ensuring adherence Patient.

Differentiation of treatment regimens ensures the appropriate use of medicines in relation to the risk of infection transmission and the likelihood of an unfavorable course. In the context of this work, this is directly related to the content analysis of the assortment by manufacturers (dosage forms, dosages, the presence of fixed combinations), which allows planning the continuity of courses, timely substitutions in case of supply interruptions, and the selection of forms/doses for certain categories (in particular, pediatrics).

Adverse reactions from TB medicines

To eliminate adverse reactions from anti-tuberculosis medicines, almost all clinical and pharmacological groups of medicines are used, depending on the type of adverse reaction that has developed (Table 2).

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Table 2. Adverse reactions of anti-tuberculosis pharmacotherapy and clinical and pharmacological groups of medicines to eliminate them

Adverse reaction	Clinical and pharmacological group medicines
Allergic reactions that can develop with the use of any anti-tuberculosis drug	Antihistamines Glucocorticosteroids
Neurological adverse reactions in the form of polyneuropathy, neuritis, disorders of the central nervous system, psychosis, including isoniazid, aminoglycosides, ethambutol, cycloserine, ethionamide, prothionamide, fluoroquinolones	Vitamin medicines (including B vitamins) Anticonvulsants (antiepileptic) medicines Antipsychotic medicines Nootropic medicines Antidepressants (as indicated)
Dyspeptic manifestations (nausea, vomiting, diarrhea, heartburn, stomach pain) when taking most anti-tuberculosis drugs	Antacids Proton pump inhibitors Prokinetics Antidiarrheal medicines Enzyme medicines Microbial medicines Probiotics
Hepatotoxic reactions with isoniazid, rifampicin, pyrazinamide	Hepatoprotective Hepatotropic medicines Solutions for intravenous administration (detoxification and infusion therapy)
Hypothyroidism that occurs when taking para-aminosalicylic acid, especially in combination with ethionamide, prothionamide	Hormonal medicines to correct thyroid function
Electrolyte imbalance (hypokalemia, hypomagnesemia) with aminoglycosides	Medicines of potassium and magnesium Solutions for intravenous administration (correction of water-electrolyte balance)
Joint pain when taking fluoroquinolones, pyrazinamide	Non-steroidal anti-inflammatory medicines

Correction of adverse reactions

Drugs for the treatment of adverse reactions of anti-tuberculosis chemotherapy are prescribed until complete or clinically significant regression of symptoms and normalization of laboratory parameters. If serious adverse reactions occur that are not controlled by pathogenetic or symptomatic therapy, within the framework of evidence-based treatment, a temporary suspension or permanent discontinuation of the presumed causative first-line anti-tuberculosis drug is implemented, with revision of the treatment regimen. The review includes the selection of an equivalent combination, considering pleural localization (pleurisy, empyema), the sensitivity of Mycobacterium tuberculosis, available alternatives by manufacturer, the availability of fixed combinations or monopreparations, as well as the risk of drug interactions and the needs of pediatric, low-dose dosing.

Algorithmically, this implies:

- ✓ identification and classification of adverse reactions;
- ✓ correction of concomitant therapy (hepatoprotection, antihistamines, etc.) and laboratory monitoring;
- ✓ according to indications - temporary suspension of the suspect's first-line antituberculosis medicine;
- ✓ continuity of the antimycobacterial coating due to alternative forms, doses, or other manufacturers (to avoid functional monotherapy in the pleural space);
- ✓ gradual recovery, replacement of components of the regimen or final withdrawal with fixation in pharmacovigilance reporting;
- ✓ a documented decision of the formulary, protocol commission of the institution regarding the further use of specific trade names in patients at risk.

Safety and concomitant therapy

Pathogenetic and anti-inflammatory drugs may be used along with basic chemotherapy to improve tolerability and symptom control. Evidence for corticosteroids in pleural forms does not demonstrate a conclusive survival benefit. The potential benefits of faster resorption of effusion are evaluated with low confidence and are accompanied by signals of side effects. Therefore, the main burden of effectiveness lies on the correct choice of regimen, doses, and duration of use of anti-tuberculosis drugs.

Glucocorticosteroids (systemic, intrapleural according to indications) are considered only as an adjuvant, selective component, since there is insufficient evidence of benefit in terms of survival in pleural forms.

Priority is given to the appropriate choice of regimen, doses, and duration of anti-tuberculosis drugs, as well as to the organization of treatment supervision and the management of drug interactions.

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Harmonization of standards and local adaptation

The update of state standards of medical care creates the basis for local validation of international approaches specifically for pleural forms and for the practical use of the results of our manufacturer-oriented content analysis (forms, dosage, fixed-dose combination, registration/program status) in the formation of formulary and organization solutions in healthcare institutions .

Evidence gaps for pleural forms

The available recommendations mostly extrapolate the data obtained in pulmonary forms of the disease. For pleural localizations, there is a lack of direct comparative data on the optimal modes, duration, and role of fixed combinations. This justifies the manufacturer-oriented content analysis of the assortment of antituberculosis medicines (dosage forms, doses, registration status) chosen by the authors of the article as a tool for the practical optimization of supply and use in tuberculous exudative pleurisy, and, according to capabilities, combined with Therapeutic Drug Monitoring for at-risk groups. TB drugs should be taken under the supervision of medical professionals (Directly Observed Therapy, Video Directly Observed Therapy), which is a key tool for ensuring adherence and preventing treatment interruption. principles of rational treatment.

Antimicrobial medicines for the treatment of tuberculous exudative pleurisy

The basis of treatment for pleural forms of tuberculous exudative pleurisy consists of antituberculosis medicines, while other antibacterial agents are used only in specific, evidence-based clinical situations (Table 3).

Table 3. Groups of antimicrobial medicines for the treatment of tuberculous exudative pleurisy

Group	Use
TB medicines	They are used exclusively for the treatment of tuberculosis and form the basis of pharmacotherapy of pleural forms of tuberculous exudative pleurisy The group includes antibacterial agents that act primarily on Mycobacterium tuberculosis (some also on other pathogens) The isolation of these drugs into a separate group is associated with the specifics of the pathogen and the rapid development of resistance to Mycobacterium tuberculosis during monotherapy Anti-tuberculosis medicines, according to the indications for their appointment, are divided into medicines of the first and second line
Antibacterial medicines (indirectly anti-tuberculosis)	This group includes fluoroquinolones, clarithromycin, amoxicillin + clavulanic acid, and linezolid Fluoroquinolones of II-IV generations have confirmed bactericidal activity against Mycobacterium tuberculosis and are used primarily in treatment regimens for multidrug-resistant tuberculosis (resistance to isoniazid and rifampicin at the same time), their effectiveness has been proven in randomized controlled trials (high level of evidence A). Clarithromycin, amoxicillin + clavulanic acid, and linezolid are considered by the WHO as drugs that are not recommended for routine therapy of tuberculosis and can be prescribed only in case of extended resistance (resistance to isoniazid, rifampicin, aminoglycosides, fluoroquinolones), when it is impossible to form a regimen of at least 4 effective anti-tuberculosis drugs. Data on their use are based mainly on a limited number of studies with a lower level of evidence, which leads to careful, selective use (level of convincing evidence D)

The main principle of antimicrobial therapy in patients with tuberculous exudative pleurisy within the framework of rational treatment management is the combined use of anti-tuberculosis drugs under the direct supervision of medical professionals (directly observed therapy, video-directly observed therapy). The treatment effectiveness of pleural forms of tuberculosis (pleurisy and empyema) with the use of anti-tuberculosis drugs was confirmed by the results of randomized clinical trials.

First-line antituberculosis medicines are the basis of pharmacotherapy and are prescribed to patients with newly diagnosed pleural forms of tuberculous exudative pleurisy and relapses of the disease in the presence of sensitive Mycobacterium tuberculosis. They form standard, evidence-based treatment regimens and are considered a basic tool for pharmacotherapy management.

Second-line anti-tuberculosis drugs are reserve agents and are used mainly in individualized pharmacotherapy regimens in case of established drug resistance of Mycobacterium tuberculosis to medicines.

The classification of anti-tuberculosis medicines is an important component of evidence-based management of tuberculous exudative pleurisy. It ensures compliance with standard chemotherapy regimens, optimal use of medicines, and prevention of further development of drug resistance of Mycobacterium tuberculosis.

Organizational emphasis

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For the implementation of the intensive and maintenance phases, the availability of relevant forms and doses, fixed combinations (where appropriate), alternative manufacturers for each active ingredient, and stable supply channels is critical. The manufacturer-oriented content analysis used by the authors of the article serves as a tool for the practical optimization of protocols, formulary policies, procurement, and the sustainable management of treatment regimens for tuberculous exudative pleurisy.

Content analysis

Content analysis in our work is considered an evidence-based management tool. It makes it possible to systematically "digitize" arrays of information on first-line antituberculosis medicines (trade names, manufacturers, release forms, dosages, features of use, safety signals) and link this data to clinically significant conclusions about the efficacy, safety, and availability of pharmacotherapy. Similar approaches (quantitative, qualitative content analysis, text mining) are already used in pharmaceutical studies to assess the quality of medicinal information, assortment structure, and pharmacovigilance signals, which confirms the evidence of the method we have chosen.

In the sample of antituberculosis medicines in circulation in Ukraine, a full range of dosage forms and dosages necessary to implement standard treatment regimens for tuberculous exudative pleurisy lesions was identified.

Dosage forms and dosage

The assortment includes solid forms with gradations of doses for the selection of weight and age categories, which makes it possible to individualize the therapy of patients with pleurisy and empyema, considering comorbidities (liver pathology, HIV infection, etc.).

For ethambutol, the presence of forms convenient for titration is considered, given the risk of visual toxicity.

The availability of multiple dosage forms and strengths across manufacturers is clinically relevant for the individualization of therapy in tuberculous exudative pleurisy, particularly in patients with comorbidities, hepatic dysfunction, or increased risk of adverse reactions. From the perspective of the manufacturer-oriented content analysis, this diversity enables uninterrupted standard regimens without forced substitutions and reduces the risk of dosing errors during intensive and maintenance phases of treatment.

Fixed warehouses

Some manufacturers have fixed formulations of drugs suitable for standard regimens. This helps to increase adherence and reduce the risk of dosage errors. At the same time, in some positions, there is a deficiency of certain fixed-dose combinations or intermediate doses, which may complicate the accurate selection of a regimen in specific clinical scenarios (for example, pleurisy with pulmonary lesions and a large bacterial mass, or the need for rapid de-escalation).

The identified gaps in certain fixed-dose combinations and intermediate strengths may complicate accurate regimen selection in specific clinical scenarios, such as tuberculous exudative pleurisy combined with pulmonary lesions or high mycobacterial burden. This directly links the assortment structure by manufacturer with treatment adherence and continuity, highlighting the practical importance of prioritizing manufacturers that offer fixed-dose combinations for standard regimens.

Pediatric suitability

Some manufacturers have children's, low-dose options (or fractional dosages). This allows you to correctly calculate doses by body weight.

In several lines, there are gaps in pediatric forms that need to be compensated for by alternative manufacturers or formulary solutions.

The revealed deficiencies in pediatric and low-dose forms among several manufacturers limit precise weight-based dosing and increase the risk of dosing inaccuracies in children with pleural forms of tuberculosis. This underscores the necessity of manufacturer-oriented redundancy and formulary solutions to ensure continuous access to appropriate pediatric formulations and to prevent treatment interruptions in this vulnerable patient group.

Practical implications for management

In the presence of a fixed-dose combination, it is advisable to prioritize them to increase adherence and reduce the pill load.

In the absence of the required fixed-dose combination, equivalent monodrug combinations with a clear algorithm for recalculating doses should be provided.

In protocol terms, formulary, it is advisable to keep at least two alternative manufacturers for each key ingredient (Isoniazid, Rifampicin, Pyrazinamide, Ethambutol) and at least one fixed-dose combination line to guarantee continuity of treatment.

For pediatric patients: a separate list of priority forms, doses, and pre-agreed replacement regimens in case of supply interruptions.

Confirmed production quality (GMP, bioequivalence)

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In the selected set of antituberculosis medicines, valid GMP confirmations were recorded for most manufacturers supplying key active ingredients (Isoniazid, Rifampicin, Pyrazinamide, Ethambutol).

For generic items, available materials on bioequivalence (report, certificate, link to dossier or publicly available reference data) have been identified, confirming the compliance of pharmacokinetic parameters with reference drugs. Some items have incomplete or outdated confirmations (old versions of GMP certificates or a lack of direct access to bioequivalence data), which require additional verification before protocol or formulary inclusion.
Good Manufacturing Practice (GMP), European Union Good Manufacturing Practice (EU GMP), Pharmaceutical Inspection Co-operation Scheme (PIC/S): most manufacturers confirm compliance; isolated exceptions are classified as low priority until the documents are updated.

Bioequivalence of generics: bioequivalence data are available for the main part of generic monodrugs (Isoniazid, Rifampicin, Pyrazinamide, Ethambutol); single gaps have been identified in individual dosages and forms.
Quality chain validation: Some manufacturers have mature pharmacovigilance, which correlates with more stable batch quality indicators and predicted safety.

When forming standard regimes and procurement plans, prioritize positions with confirmed GMP compliance and complete bioequivalence data. For drugs with an incomplete evidence base of quality, use conditional formulary inclusion (limited period, additional quality control/pharmacovigilance);

Provide at least two alternative manufacturers for each active ingredient with valid GMP and verified bioequivalence for supply stability and interchangeability in case of interruptions.

In local formulary protocols, separately mark the priority fixed-dose combination with confirmed production quality and bioequivalence as a tool to reduce pill burden and the risk of dosing errors.

Logistical and economic feasibility

Within the framework of the manufacturer-oriented analysis, the ability of each position to provide continuous courses of therapy, supply reliability, market availability, logistics risks (import delays, currency fluctuations, geopolitical restrictions, dependence on one production site, price feasibility) was assessed.

Therefore, logistical redundancy (alternative manufacturers, duplication of forms and doses) is a prerequisite for continuous courses in tuberculous exudative pleurisy, avoids "functional monotherapy" in the pleural space, and supports the implementation of treatment standards.

According to the State Register of Medicines of Ukraine, they were registered and allowed for circulation in health care institutions. After summarizing the processed data, a list of antituberculosis medicines was compiled. There are 41 items (Table 4).

Table 4. List of antituberculosis medicines

No.	**Trade name / Manufacturer / Country**	**Dosage form, weight, amount per unit**
1	2	3
1.	Ethambutol hydrochlori de / 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

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No.	Trade name / Manufacturer / Country	Dosage form, weight, amount per unit
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 series) / 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

At the next stage of the content analysis, the studied medicines were distributed according to the indicator to calculate the number of producing countries. Primary data were selected and processed (Table 5).

Table 5. Primary data for content analysis by manufacturer

No.	Manufacturer	Quantity
1.	Swizera labs private limited, INDIA	1
2.	Kadila Pharmaceuticals Limited, India	1
3.	PJSC "Kyivmedpreparat", Ukraine	2

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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**

Table 5 shows that the products of 10 manufacturers are presented in circulation in health care institutions. The number of medicines of these manufacturers is from 1 to 8 items.
When calculating the number of medicines produced by different pharmaceutical manufacturers, the number of groups was determined: n=1+3.322·lgN= 1+3.322·lg10= 4.322. We take n=4 groups. The group step is defined.

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

We take h=2.

The distribution of the step according to the groups is indicated in Table. 6.

Table 6. Determination of the step limit of groups when generalizing by manufacturers

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

Based on the data obtained in Table 7, we can analyze the pharmaceutical market by manufacturers. The first group included one domestic manufacturer and three foreign manufacturers, with counts ranging from 0 to 2 items. Together, they provide the release of six first-line antituberculosis medicines.
Group 2 is represented by two foreign manufacturers with eight trade names of medicines.
Group 3 contains one domestic manufacturer - PrJSC "Pharmaceutical firm "Darnytsia", which produces five items of first-line antituberculosis medicines.
Group 4 unites two domestic and one foreign manufacturer, which together provide 22 items of antituberculosis medicines. It is this group that demonstrates the greatest demand in clinical practice, procurement, and pharmaceutical supply.
Based on the content analysis of medicines by manufacturers and by quantitative indicators, statistical processing of the study results was carried out by constructing discrete variation series and polygons of distribution of the obtained data. Discrete variation series of drug distribution in Table. 8.

Table 8. Discrete variation series

Group No.	**Group Range**	**Frequency, f, and**
1	0-2	6
2	3-4	8
3	5-6	5
4	7-8	22

The discrete variation series is an ordered distribution of units of the studied population into groups (determined by the Sturgess formula) based on a specific variable (the number of anti-tuberculosis drugs). The resulting discrete variational series of the distribution of medicines indicates that the studied quantitative indicator of producers falls within the fourth group (ranging from 7 to 8), with the highest frequency (f_i=22).

In the social dimension, studies of groups of manufacturers with four or more trade names (groups 2, 3, and 4) can be considered as economically accessible and strategically important for patients and healthcare institutions, since they form the basis for a stable supply of basic drugs for standard treatment regimens.

The obtained results of the manufacturer-oriented content analysis, including the formation of a list of 41 trade names of antituberculosis medicines, the identification of four manufacturer groups according to assortment width and supply stability, and the revealed gaps in fixed-dose combinations and pediatric dosage forms, make it possible to form a holistic, evidence-based management concept for the pharmacotherapy of pleural forms of tuberculosis (pleurisy, empyema). These data directly link clinical needs (full-fledged regimens, appropriate dosage

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forms, and strengths) with real supply capabilities and create an applied basis for formulary decisions, local protocols, and procurement planning.

In the context of the clinical perspective of the treatment of tuberculous exudative pleurisy, antituberculosis medicines also key to control safety and adherence to treatment, in particular:

- ❖ hepatotoxicity (nausea, vomiting, jaundice, changes in liver tests);
- ❖ visual disturbances (especially with the use of ethambutol): basic and repeated assessment of visual acuity and color perception;
- ❖ drug interactions (anticoagulants, hormonal contraceptives, antiretroviral drugs, etc.);
- ❖ adherence to therapy, since interruption or irregular intake of first-line drugs increases the risk of recurrence of the disease and the formation of drug resistance.

In contrast to broad reviews or pharmacoeconomic assessments, in this work, the unit of analysis is each specific drug (monodrug) described in a set of sources (instructions for medical use, data of state registration, inclusion in current guidelines, protocols, standards), with further grouping by manufacturers and interpretation for formulary or local protocol policy and procurement decisions.

The practical meaning of manufacturer-oriented content analysis is that it combines clinical needs (a full-fledged regimen, safe combinations, convenient forms for controlled treatment) with real supply opportunities (the width of the line for a particular manufacturer, the availability of fixed combinations and different dosages, stability of market presence, participation in state and regional programs).

For pleural forms, where breaks and forced substitutions are unacceptable, this has direct clinical and organizational value.

The content analysis helps to increase access to timely diagnosis, continuous treatment, and proper pharmaceutical support of tuberculous exudative pleurisy, which optimizes the evidence-based clinical perspective: the risks of interruption of therapy courses, loss of patients from supervision, and the formation of drug resistance, including against the background of irrational use of anti-tuberculosis drugs, are reduced.

Obtained data show that, despite the preservation of anti-tuberculosis drugs as a cornerstone of the treatment of drug-sensitive tuberculosis, the pharmacokinetic features of the pleural space, the indirect nature of the diagnosis of exudative pleurisy of tuberculous genesis, and the emergence of new (including shorter) regimens form a significant gap of evidence for this form of the disease.

This justifies the need for a prospective clinical study of antituberculosis medicines regimens for pleural forms of tuberculous exudative pleurisy to optimize dosages, duration of treatment, monitoring approaches (including Therapeutic Drug Monitoring), and algorithms of concomitant interventions (drainage, the role of corticosteroids) to improve the effectiveness, safety, and prevention of resistance in the Ukrainian healthcare system.

The redundancy policy is practically significant: at the protocol, formulary, and procurement levels, a minimum of two suppliers for each active ingredient and one fixed-dose combination should be recorded to reduce pill load and dosage errors. Fixed drugs should be available to a doctor or pharmacist for immediate use in the event of interruptions. In pediatrics, it is worth establishing a separate reserve of low-dose, dispersed formulations.

In line with the study objective, the following findings were obtained.

Regarding regimen suitability, a comprehensive range of dosage forms and strengths required for standard regimens for tuberculous exudative pleurisy was identified, enabling the evidence-based implementation of both intensive and continuation phases.

Regarding safety, documented GMP compliance and available bioequivalence data were confirmed for most anti-tuberculosis medicines; however, isolated gaps in quality documentation were identified for specific products, representing a study limitation.

Regarding availability, a structured list of 41 trade names marketed in Ukraine was compiled, reflecting the actual assortment accessible for clinical practice.

Regarding treatment continuity, four manufacturer groups were distinguished by assortment completeness and supply stability, underscoring the need for manufacturer-level redundancy and alternative suppliers to prevent unplanned substitutions and regimen interruptions.

Practical recommendations

Practical recommendations are based on clinical technology and content analysis, which include a compiled list of 41 trade names of anti-tuberculosis medicines available on the Ukrainian market, the identification of four manufacturer groups by assortment completeness and supply stability, and the detection of gaps in fixed-dose combinations and pediatric dosage forms. The results provide a practical basis for surgeons' clinical decisions to ensure continuity of pharmacotherapy for pleural forms of tuberculosis.

For a clinician (phthisiatrician, pulmonologist, family doctor)

- Base the treatment of pleural forms of tuberculous exudative pleurisy on antituberculosis medicines
- In patients with sensitive Mycobacterium tuberculosis, use standardized regimens with antituberculosis medicines as a basis (intensive + maintenance phase), avoiding an unreasonable transition to backup antibacterial agents
- Differentiate modes by the severity of the process

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- In patients with destructive changes in the lungs and bacterial excretion, it is reasonable to use more intensive regimens (prolonged intensive phase) followed by a maintenance phase; in the absence of destruction and bacterial excretion, avoid excessive escalation of therapy.
- Monitor the safety of treatment.
- Regularly assess risks: hepatotoxicity (symptoms + liver tests), visual disturbances (ethambutol), drug interactions (anticoagulants, contraceptives)
- In case of serious adverse reactions - correction of the regimen using clear algorithms
- Ensure adherence to therapy (directly observed therapy, video-directly observed therapy).
- Use models of directly observed therapy for groups at high risk of treatment interruption (socially vulnerable, migrants, patients with comorbidities, post-COVID, long-COVID conditions), record dose misses, and promptly adjust
- Focus not only on the completion of the course, but also on the totality: clinical remission, regression of pleural effusion, absence of active Mycobacterium tuberculosis in another localization, restoration of functional status.

For the clinical pharmacist

- Use the results of content analysis in the formation of a protocol, form
- Select antituberculosis medicines considering: available forms and dosages, compliance of instructions with standard regimens, safety profile, proven quality, and stability of supplies from the manufacturer
- Prioritize manufacturers with a more complete line of antituberculosis medicines. During formulary solutions and procurement, preference should be given to groups of manufacturers that have ≥4 antituberculosis medicines and a stable presence in the market - this increases the sustainability of pharmaceutical supply
- Organize pharmacological surveillance and documentation of adverse reactions
- Systematically collect information on adverse reactions (hepatotoxicity, neurotoxicity, ophthalmonneuropathy, etc.), transfer data to pharmacological surveillance, and take them into account when updating local formularies
- Support the doctor in individualizing the schemes
- Advise on possible drug interactions, dose adjustment in comorbidities (hepatic/renal insufficiency, HIV, diabetes mellitus), and alternatives for intolerance to first-line drugs
- Communicate with the patient.

Explain the rules of administration (single daily dose, interaction with food), the importance of continuity of treatment, and symptoms of "anxiety" (jaundice, visual disturbances, severe weakness), for which you need to immediately consult a doctor.

For the health care manager, the administration of the institution follows protocol. of the Formulary Commission

- Integrate content analysis into the planning and procurement process
- Use the content analysis matrix (41 drugs, 4 groups of manufacturers) to: select key first-line drugs, identify "strategic" manufacturers, avoid excessive fragmentation of the assortment
- Ensure continuity of supply of antituberculosis medicines
- To form buffer stocks of drugs from priority groups of manufacturers, especially in conditions of migration, organization disruptions, with a focus on drugs for the intensive phase of treatment
- Support the implementation of directly observed therapy, video-directly observed therapy. Organizationally and financially provide the possibility of directly controlled therapy (human resources, telemedicine, telepharmaceutical solutions, staff training), understanding it as a tool for preventing relapse and resistance
- Regularly review local protocols and formularies of tuberculous exudative pleurisy. Update them considering: international recommendations, local data on adverse reactions, and the results of content analysis of the antituberculosis medicines market. Ensure consistency of clinical protocols, formulary, and procurement contracts.
- To consider the social and economic component of tuberculous exudative pleurisy
- Assess the availability of drugs for patients (including the outpatient stage), plan support programs, reimbursement, prioritize antituberculosis medicines with an optimal balance of "effectiveness-safety-cost".

Conclusions

1. Clinical technology based on content analysis was substantiated as a practical tool for optimizing pharmacotherapy in tuberculous exudative pleurisy, enabling a structured assessment of anti-tuberculosis medicines across clinically relevant parameters: regimen suitability, safety, availability of dosage forms and strengths, fixed-dose combinations, documented quality assurance (GMP compliance and bioequivalence evidence), and supply stability.
2. A comprehensive range of dosage forms and strengths required for implementing standard treatment regimens for pleural tuberculosis was identified. At the same time, inter-manufacturer differences in the availability of fixed-dose combinations, low-dose formulations, and pediatric dosage forms were documented, resulting in different levels of clinical applicability across specific products.
3. A structured list of 41 trade names of anti-tuberculosis medicines available on the Ukrainian market was compiled, and four manufacturer groups were identified based on a comprehensive evaluation of assortment breadth, dosage availability, documented quality assurance, and supply stability. These findings provide an evidence-based basis for prioritizing specific products in formulary decisions, local protocols, and procurement planning.

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4. The clinical relevance of pleural-space pharmacokinetic characteristics was highlighted, particularly the risk of subtherapeutic concentrations of rifampicin and pyrazinamide. This emphasizes the need to maintain uninterrupted standard regimens without unplanned substitutions or treatment gaps and supports programmatically ensured access to appropriate dosage forms and strengths.
5. The study outputs (the compiled list of 41 trade names, manufacturer grouping, and identified gaps in fixed-dose combinations and pediatric forms) enable the development of practical recommendations for TB physicians, clinical pharmacists, and formulary and procurement committees, considering the need for treatment continuity, minimization of drug-resistance risks, and improved patient adherence.
6. Reserving at least two alternative manufacturers for each key active ingredient (isoniazid, rifampicin, pyrazinamide, ethambutol), as well as ensuring the availability of at least one fixed-dose combination line, was substantiated as a strategy to strengthen supply-chain resilience and prevent "functional monotherapy" in pleural disease.
7. A significant evidence gap remains regarding optimal regimens specifically for tuberculous exudative pleurisy, supporting the need for further prospective clinical studies focusing on dose optimization, treatment duration, and the implementation of Therapeutic Drug Monitoring (TDM) in high-risk groups to improve effectiveness and safety.
8. The proposed approach provides an applied basis for integrating clinical technology based on content analysis into the management of pharmacotherapy for pleural tuberculosis at the levels of clinical practice, protocols, formulary policy, and procurement, strengthening the resilience of treatment systems under conditions of war, migration, and supply disruptions in surgical clinics.

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Surgical clinic for the treatment of tuberculous exudative pleurisy: availability of anti-tuberculosis drugs
Viktoriia Shapovalova, Viktoria Dovzhuk, Natela Dovzhuk
Introduction. Tuberculous exudative pleurisy remains a complex clinical problem for surgical practice, especially in wartime, logistical disorders, and limited access to medicines. The peculiarities of the course of the disease, difficulties in diagnosis, and the need for invasive verification methods cause delays in diagnosis and treatment. The effectiveness of pharmacotherapy largely depends not only on the pharmacological properties of anti-tuberculosis drugs, but also on the stability of their availability in the pharmaceutical market. **Purpose.** To assess the availability of anti-tuberculosis drugs in Ukraine's pharmaceutical market using clinical content analysis technology, to ensure continuous pharmacotherapy for patients with tuberculous exudative pleurisy in surgical clinics. **Materials and methods.** The study was conducted from 2022 to 2026. The object of the study was anti-tuberculosis drugs in circulation in Ukraine. Clinical content analysis technology, based on the principles of evidence-based medicine, evidence-based pharmacy, and clinical and pharmacological analysis, was used. data processing (Sturgess formula), as well as regulatory, documentary, marketing, and graphic research methods. **Results.** The presence of 41 names of anti-tuberculosis drugs on the pharmaceutical market of Ukraine has been established. 4 groups of manufacturers have been identified based on the breadth of their range and the stability of their supply. It has been found that most drugs have confirmed quality of production (GMP) and bioequivalence, but there are some gaps in the availability of fixed combinations and pediatric forms. It has been proven that the continuity of pharmacotherapy depends on the availability of alternative manufacturers, the variety of dosage forms, and the stability of supply. **Discussion.** Content analysis as an innovative tool allows you to systematize information about medicines and relate it to clinical needs. The results obtained emphasize the importance of organizational support of treatment, including the formation of formularies, procurement planning, and ensuring the continuity of therapy. Particular attention should be paid to the risk of pharmacokinetic alterations associated with pleural localization, which may affect treatment effectiveness. **Conclusions.** Clinical technology of content analysis is an effective tool for assessing the availability of anti-tuberculosis drugs and optimizing pharmacotherapy for tuberculous exudative pleurisy. The need to provide at least two alternative manufacturers for each active ingredient and the availability of fixed combinations to increase adherence to treatment and prevent interruption of therapy have been determined. forms and procurement planning in health care institutions.
Keywords: tuberculous exudative pleurisy, surgical clinic, anti-tuberculosis drugs, clinical technology, content analysis, drug availability, pharmacotherapy, supply chains, formulary solutions

References
1. Tanimura T., Jaramillo E., Weil D., Raviglione M., Lönnroth K. Financial burden for tuberculosis patients in low- and middle-income countries: a systematic review and meta-analysis. *European Respiratory Journal*. 2014. Vol. 43. No. 6. P. 1763–1775. DOI: https://doi.org/10.1183/09031936.00193413
2. Osyntseva A. Tuberculosis: pharmacognosy, medicinal plant raw materials, medicinal plants, phytotherapy. *SSP Modern Pharmacy and Medicine*. 2024. Vol.4. No.1. P.1-10. P.1-10. DOI: https://doi.org/10.53933/sspmpm.v4i1.130
3. Shapovalova V. Innovative approaches to medical and pharmaceutical care, pharmacotherapy, and availability of pharmaceutical supplies for Tuberculosis patients in wartime. *SSP Modern Pharmacy and Medicine*. 2025. Vol.5. No.1. P.1-17. DOI: https://doi.org/10.53933/sspmpm.v5i1.170

4. Nevgoda O. A., Rak L. M., Nevgoda A. A., Furgala Y. I., Protsyuk R. G. Exudative pleurisy of tuberculous genesis in the structure of extrapulmonary tuberculosis and the total number of exudative pleurisies. Tuberculosis, lung diseases, HIV infection. 2020. No. 1 (40). P. 49-55. DOI: https://doi.org/10.30978/TB2020-1-49
5. Order of the Ministry of Health of Ukraine dated January 19, 2023 No. 102 On approval of the standards of medical care Tuberculosis. State Expert Center of the Ministry of Health of Ukraine. 2023. https://www.dec.gov.ua/wp-content/uploads/2023/01/43242-dn_102_19012023.pdf
6. Standards of medical care Tuberculosis. State Expert Center of the Ministry of Health of Ukraine. 2023. https://www.dec.gov.ua/wp-content/uploads/2023/01/43243-dn_102_19012023_dod.pdf
7. Ministry of Health of Ukraine. On Approval of Standards of Medical Care Tuberculosis. Order of the Ministry of Health of Ukraine No. 102 dated 19.01.2023. Kyiv. 2023. https://moz.gov.ua/uk/decrees/nakaz-moz-ukraini-vid-19012023--102-pro-zatverdzhennja-standartiv--medichnoi-dopomogi-tuberkuloz
8. Ministry of Health of Ukraine. On Approval and Implementation of Medical and Technological Documents on the Standardization of Medical Care for Tuberculosis (Unified Clinical Protocol). Order of the Ministry of Health of Ukraine No. 620 dated 04.09.2014 (as amended in 2014–2023). Kyiv. https://moz.gov.ua
9. Ministry of Health of Ukraine; State Expert Center of the Ministry of Health of Ukraine. State Formulary of Medicines of Ukraine. Current edition. Kyiv. 2025. https://moz.gov.ua/uk/decrees/nakaz-moz-ukrayini-vid-13-06-2025-971-pro-zatverdzhennya-simnadcyatogo-vipusku-derzhavnogo-formulyara-likarskih-zasobiv-ta-zabezpechennya-jogo-dostupnosti
10. National Health Service of Ukraine. Medical Guarantee Program: Service Specifications and Requirements for Providers in the Field of Diagnosis and Treatment of Tuberculosis. Kyiv. 2023–2025. https://nszu.gov.ua
11. Tuberculosis. Evidence-based clinical guideline. State Expert Center of the Ministry of Health of Ukraine. 2023. https://www.dec.gov.ua/wp-content/uploads/2023/01/klinichna-nastanova-tuberkuloz-sichen-2023.pdf
12. Center for Public Health of the Ministry of Health of Ukraine. Clinical guidelines and standards of medical care: Tuberculosis. Drug-sensitive tuberculosis in adults (update harmonized with the recommendations of the World Health Organization). Kyiv. 2023. https://phc.org.ua
13. Christy J. Content analysis of internet marketing strategies: how pharmaceutical companies communicate about contraceptives with consumers online. Journal of Medical Internet Research. 2009. DOI: https://doi.org/10.1080/15245000903038308
14. Golder S., O'Connor K., Wang Y. et al. The value of social media analysis for adverse events and pharmacovigilance: systematic review. *JMIR Public Health and Surveillance*. 2024. No. 10. P. e59167. DOI: https://doi.org/10.2196/59167
15. Osyntseva A. A., Shapovalov V. Management and marketing of circulation of first-line antituberculosis medicines: use of innovative research technologies. *SSP Modern Pharmacy and Medicine*. 2023. Vol. 3. No. 4. P. 1–13. DOI: https://doi.org/10.53933/sspmpm.v3i4.114
16. Le J., Schmid T. The practice of innovating research methods. *Sage Journal*. 2020. DOI: https://doi.org/10.1177/1094428120935498
17. Yilmaz F., Dokme Yagar S., Gungor Ozcan D., Ozyildiz Z. Content analysis of pictograms used in pharmaceutical leaflets in Turkey. *Acta Pharmaceutica Sciencia.* 2025. Vol. 63. No. 3. P. 722-733. DOI: https://doi.org/10.23893/1307-2080.APS6345
18. Nevzghoda O. A., Shapovalov V. V., Shapovalova V. O., Osyntseva A. O., Shapovalov V. V., Protsiuk R. H. Optimisation of antibiotic selection: ABC and VED analysis of medicines against intracellular microorganisms. *Tuberculosis, Pulmonary Diseases, HIV-Infection.* 2025. Vol. 3(62). P. 68-79. DOI: https://doi.org/10.30978/TB2025-3-68
19. Shapovalova V., Nevzghoda O., Shapovalov V., Osyntseva A., Lavoshnyk O., Shapovalov V. Antibiotic pharmacotherapy of pleurisy, pleural empyema, infections of various genesis: ABC and VED analysis. Rev. Colomb. Cienc. Quím. Farm. 2026. Vol. 55. No. 1. P. 88-108. DOI: https://doi.org/10.15446/rcciquifa.v55n1.125038
20. Shapovalova V. O., Nevzghoda O. A. Shapovalov V. V. et al. Tuberculous pleural disease (pleuritis, empyema): clinical perspective on first-line antituberculosis medicines and manufacturer-based content analysis. Tuberculosis, Lung Diseases, HIV Infection. 2026. No.1. P.36-40. DOI: https://doi.org/10.30978/TB2026-1-36

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