

Қазіргі заманғы маңызды мәселелер

Актуальные проблемы современности

Actual Problems of the Present

№4 (50)

**ҚАЗІРГІ ЗАМАНҒЫ
МАҢЫЗДЫ МӘСЕЛЕЛЕР**

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The current state of the pharmaceutical market for drugs used in oncological diseases in the Republic of Kazakhstan

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Abstract

Oncological diseases remain one of the key medical and social problems in the Republic of Kazakhstan, forming a significant burden on the health care system and the mechanism of drug provision. The purpose of the study was a comprehensive assessment of the current state of the pharmaceutical market of antitumor drugs of the Republic of Kazakhstan in the context of the implementation of the Comprehensive Plan for 2023-2027 with an emphasis on the regulatory environment, assortment structure, sources of supply of these drugs and pharmacoeconomic characteristics of therapy. This study utilized structural, comparative marketing and pharmacoeconomic analysis methods, using data from the State Register of Medicines, official statistics from the Ministry of Health of the Republic of Kazakhstan, and information on actual procurement volumes of oncology drugs in 2025 (as of October). An analysis of the product range by Anatomical Therapeutic Chemical (ATC) classification, dosage forms, and trade names was conducted, the role of orphan drugs was assessed, and procurement leaders were identified. The average cost per package and per treatment course for key anticancer drugs was calculated based on instructions for medical use and standard clinical treatment regimens. The study results showed that the pharmaceutical market for oncology drugs in Kazakhstan is characterized by a high concentration of costs on a limited list of targeted and biological drugs, while imports predominate. A significant pharmacoeconomic differentiation was identified between classic cytostatics and innovative drugs, which is of significant importance for planning public funding and optimizing drug provision for cancer patients.

Keywords: oncology drugs, pharmaceutical market, drug provision, marketing analysis, pharmacoeconomic assessment.

Қазақстан Республикасында онкологиялық ауруларда қолданылатын дәрілік заттардың фармацевтикалық нарығының қазіргі жағдайы

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Аннотация

Онкологиялық аурулар Қазақстан Республикасындағы негізгі медициналық және әлеуметтік мәселелердің бірі болып табылады, бұл денсаулық сақтау жүйесіне және дәрілік заттармен қамтамасыз ету механизмдеріне айтарлықтай ауыртпалық түсіреді. Зерттеудің мақсаты 2023-2027 жылдарға арналған кешенді жоспарды іске асыру аясында Қазақстан Республикасындағы қатерлі ісікке қарсы дәрілік заттардың фармацевтикалық нарығының қазіргі жағдайын кешенді бағалау болды, онда реттеуші ортаға, өнім қоспасының құрылымына, дәрілік заттармен қамтамасыз ету көздеріне және емдеудің маркетингтік және фармакоэкономикалық сипаттамаларына назар аударылды. Зерттеуде дәрілік заттардың мемлекеттік тізілімінің деректері, Қазақстан Республикасы Денсаулық сақтау министрлігінің ресми статистикалық мәліметтерін және 2025 жылы (қазан айындағы жағдай бойынша) онкологияда қолданылатын дәрілерді сатып алудың нақты көлемі туралы ақпарат пайдаланылып, құрылымдық, салыстырмалы маркетингтік және фармакоэкономикалық талдау әдістері қолданылды. Өнім қоспасы анатомия-терапевтикалық, химиялық (АТХ) жіктемесі, дәрілік түрлері және сауда атаулары бойынша талданды, орфандық дәрілік заттардың рөлі бағаланды және сатып алу көшбасшылары анықталды. Негізгі қатерлі ісікке қарсы дәрілердің бір қаптамасының және емдеу курсының орташа құны медициналық қолдану жөніндегі нұсқаулықтар мен стандартты клиникалық емдеу режимдеріне негізделіп есептелді. Зерттеу нәтижелері Қазақстандағы онкологияда қолданылатын дәрілік заттардың фармацевтикалық нарығы таргетті және биологиялық препараттардың шектеулі тізіміне шығындардың жоғары шоғырлануымен сипатталатынын, ал импорт басым екенін көрсетті. Классикалық цитостатиктер мен инновациялық препараттар арасында айтарлықтай фармакоэкономикалық айырмашылық анықталды, бұл мемлекеттік қаржыландыруды жоспарлау және қатерлі ісікпен ауыратын науқастарды дәрімен қамтамасыз етуді оңтайландыру үшін маңызды.

Кілт сөздер: онкологияда қолданылатын дәрілік заттар, фармацевтикалық нарық, дәрімен қамтамасыз ету, маркетингтік талдау, фармакоэкономикалық бағалау.

Современное состояние фармацевтического рынка препаратов, применяемых при онкологических заболеваниях в Республике Казахстан

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Аннотация

Онкологические заболевания остаются одной из ключевых медико-социальных проблем в Республике Казахстан, формируя значительную нагрузку на систему здравоохранения и механизмы лекарственного обеспечения. Целью исследования явилась комплексная оценка современного состояния фармацевтического рынка противоопухолевых препаратов Республики Казахстан в условиях реализации Комплексного плана на 2023–2027 годы с акцентом на регуляторную среду, структуру ассортимента, источники снабжения данных лекарств, маркетинговые и фармакоэкономические характеристики терапии. В работе использованы методы структурного, сравнительного маркетингового и фармакоэкономического анализа с применением данных Государственного реестра лекарственных средств, официальной статистики Министерства здравоохранения Республики Казахстан, а также сведений о фактических объёмах закупок онкологических препаратов в 2025 году (по состоянию на октябрь). Проведён анализ ассортимента по анатомо-терапевтической и химической (АТХ) классификации, лекарственным формам и торговым наименованиям, оценена роль орфанных препаратов и выявлены лидеры закупок. Рассчитана средняя стоимость одной упаковки и одного курса лечения для основных противоопухолевых лекарственных средств на основании инструкций по медицинскому применению и стандартных клинических схем терапии, используемых в национальной онкологической практике. Результаты исследования показали, что фармацевтический рынок онкологических препаратов Казахстана характеризуется высокой концентрацией затрат на ограниченный перечень таргетных и биологических лекарственных средств при одновременном доминировании импортных поставок. Выявлена выраженная фармакоэкономическая дифференциация между классическими цитостатиками и инновационными препаратами, что имеет существенное значение для планирования государственного финансирования, совершенствования закупочной политики и оптимизации лекарственного обеспечения онкологических пациентов страны.

Ключевые слова: онкологические препараты, фармацевтический рынок, лекарственное обеспечение, маркетинговый анализ, фармакоэкономическая оценка

1. Introduction

Oncological diseases in the Republic of Kazakhstan are among the priority medical and social problems, which has led to the development of an extensive system of legal regulation in the field of oncological care and drug supply. The foundations of state policy in the field of health protection and drug circulation are enshrined in the Code of the Republic of Kazakhstan «On Public Health and Healthcare System», which defines guarantees of public access to medical care and medicines, including anticancer drugs (On Public Health and Healthcare System No. 360-VI ZRK, 2020). The organization of specialized oncological care is regulated by the standard for the provision of oncological care to the population, which establishes requirements for patient routing, the use of medicines, and the equipment of medical organizations (On Approval of the Standard for the Organization of Oncology Care for the Population of RK No. KR DSM-112, 2021). Strategic directions for the development of oncology services, including expanding access to modern targeted and immuno-oncology drugs, are defined by the Comprehensive Plan to Combat Cancer in the Republic of Kazakhstan for 2023-2027 No. 874, 2023. The structure of the pharmaceutical market is additionally influenced by regulations governing the lists of orphan diseases and drugs (On approval of the list of orphan diseases and drugs for their treatment No. KR DSM - 142/2020, 2020), price regulation mechanisms within the framework of the guaranteed volume of medical care and compulsory health insurance (On approval of maximum prices for the trade name of medicines and

medical devices No. KR DSM-9 and No. KR DSM-77, 2021), as well as procedures for registration and approval of drugs on the market through the State Register of Medicines and Medical Devices (State Register of Medicines and Medical Devices, 2025). Taken together, these documents form the institutional environment within which the oncology drug market operates, which necessitates a comprehensive marketing and medical-economic analysis of its structure, availability, and dependence on imported supplies.

The Comprehensive Cancer Control Plan for 2023–2027 is a key strategic document designed to systematically modernize all oncology care in the Republic of Kazakhstan. It aims to improve the effectiveness of early diagnosis, develop specialized treatment, introduce modern therapeutic methods, and strengthen the oncology infrastructure in all regions of the country. Significant funding of approximately 460.7 billion tenge has been allocated for the plan's implementation, which should not only improve service availability but also reduce the proportion of advanced cases and cancer mortality. The plan places particular emphasis on expanding access to modern treatment methods, including the installation of state-of-the-art radiation therapy equipment and the provision of essential medications locally. The plan also envisions the active use of telemedicine and digital technologies to bridge the gap in the quality of oncology care between urban and rural areas. The analytical indicators envisage a reduction in the proportion of advanced (stages III–IV) cases to 10% and an increase in the coverage of patients with radiation therapy to 53% by 2027, and the document itself is aimed at achieving world standards in the provision of oncological care in the country (On approval of the Comprehensive Plan to Combat Cancer in the Republic of Kazakhstan for 2023–2027 No. 874, 2023).

In the Republic of Kazakhstan, about 480 oncological diseases and neoplasms (tumors) are diagnosed, classified according to the International Classification of Diseases (ICD-10) codes from C00.0 to C97, of which 17 nosologies are classified as orphan (rare) diseases, which indicates their presence and clinical and epidemiological significance both at the national and global levels (On approval of the list of orphan diseases and drugs for their treatment No. KR DSM - 142/2020, 2020; On approval of the list of diseases for which specialized medical care in inpatient settings is provided on a planned basis No. KR DSM-258/2020, 2020).

An analysis of the current oncological situation in the Republic of Kazakhstan shows that over 37 thousand new cases of malignant neoplasms are registered in the country annually, while more than 13 thousand patients die from oncological diseases annually, and the total number of people registered for dispensary care exceeds 205 thousand people, as a result of which mortality from oncopathology consistently ranks second in the structure of overall mortality of the population; during the implementation of the Comprehensive Plan to Combat Cancer for 2018–2022, mortality from malignant neoplasms decreased by 15% (from 78.1 to 66.8 per 100,000 population), but significant regional differentiation in the indicators remains, with the highest mortality rates observed in the East Kazakhstan, Abay, Pavlodar and North Kazakhstan regions, with lung cancer (16.3%), stomach cancer (12.0%), colorectal cancer (10.6%) and breast cancer (8.1%) dominating in the mortality structure, while breast cancer (13.2%), lung cancer (10.0%), colorectal cancer (9.3%) and stomach cancer (7.4%) are in the lead in the morbidity structure; More than 55.8% of cases are among people of working age, while the early detection of cancer (stages 0–I) in 2022 increased to 29.0%, but did not reach target values, and the proportion of advanced forms (stages III–IV) decreased to 12.1%, remaining above the planned level, which, along with a five-year survival rate of 55.3%, emphasizes the continuing relevance of further improving cancer care and drug provision to the population (On approval of the Comprehensive Plan to Combat Cancer in the Republic of Kazakhstan for 2023–2027 No. 874, 2023).

According to statistics from the Ministry of Health of the Republic of Kazakhstan, the number of patients diagnosed with malignant neoplasms for the first time in their lives, registered by oncology organizations, amounted to 41,519 patients in 2023, and 41,292 patients in 2024, while the proportion of cases detected at stage IV reached 11.7%, and despite the specialized oncological care provided, the mortality rate among the observed contingents remains at 5.5% (Statistical collection, 2025).

Thus, the relevance of this study is determined by the high medical and social significance of oncological diseases, the steady increase in incidence, and the ongoing burden on the healthcare system. Despite the existence of an extensive regulatory framework and the implementation of large-scale state programs, the pharmaceutical market for oncology drugs in the Republic of Kazakhstan is characterized by high dependence on imported supplies, limited availability of innovative drugs, and significant heterogeneity in regional supply. Under these conditions, a comprehensive analysis of the market structure, drug product range, and pharmacoeconomic parameters of therapy is necessary to substantiate management decisions in the area of pharmaceutical policy.

The objective of the study was to comprehensively assess the current state of the pharmaceutical market for oncological drugs in the Republic of Kazakhstan, identifying its structural, marketing, and medical-economic characteristics, the availability of innovative anticancer drugs, and the degree of dependence on imported supplies.

2. Materials and methods

The study materials included regulatory legal acts of the Republic of Kazakhstan in the field of healthcare and drug provision for cancer patients, official statistics from the Ministry of Health of the Republic of Kazakhstan, information from the State Register of Medicines and Medical Devices and the Kazakhstan National Drug Formulary, analytical reports on the pharmaceutical market, marketing research data, as well as information on hospital and retail purchases of drugs used in oncology (as of October 2025), provided by the pharmaceutical analytical and consulting agency Vi-ORTIS with the support of the pharmaceutical company PARACELS LLP.

The research methods involved the use of a combination of analytical and economic approaches, including: content analysis of regulatory documents to assess the regulatory environment for the functioning of the pharmaceutical market for oncology drugs; marketing analysis using market segmentation methods by ATC classification, international nonproprietary names, pharmacological groups, dosage forms, manufacturing countries, and manufacturing corporations; structural analysis of the range and consumption volumes of anticancer drugs in monetary and physical terms; Pharmacoeconomic analysis, including assessment of drug therapy costs and pricing structure analysis; statistical data processing methods, including calculation of relative indicators, shares, and dynamics of key market parameters.

The use of these materials and methods allowed for a comprehensive and objective assessment of the state of the pharmaceutical market for oncology drugs in the Republic of Kazakhstan and the formation of scientifically sound conclusions and recommendations.

3. Results and their discussion

Regulatory environment for pharmaceutical market oncology drugs

Analysis showed regulatory environment for oncology drug market in Kazakhstan is highly centralized with multi-layered legal regulation covering registration, pricing, procurement, and use. Basic requirements for circulation of anticancer drugs are in Code of Kazakhstan «On Public Health and Healthcare System», establishing state oversight of quality, safety, availability, and provision via Guaranteed free medical care (GFMC) and Compulsory social health insurance (CSHIS). Standards for oncology care organization, defining drug lists and patient routing, strongly influence drug consumption structure. Regulations set mandatory conditions for market approval and clinical practice inclusion, directly affecting demand and public procurement volumes. Key constraints include long registration and inclusion deadlines for innovative drugs, strict price regulation, limited flexibility for high-tech medication cost adjustments. Despite 2023–2027 Comprehensive Plan to Combat Cancer expanding access to targeted and immuno-oncology therapies, high dependence on imports and uneven supply persists, highlighting need to streamline registration, expand pharmacoeconomic tools, and incentivize local production.

At the same time, the study's results revealed a number of systemic regulatory constraints affecting the development of the oncology drug market. Key among these remain the long registration

and inclusion deadlines for innovative anticancer drugs in reimbursement systems, strict price regulation, and limited flexibility to adjust price caps in the face of rising costs for high-tech medications. Despite the implementation of the Comprehensive Plan to Combat Cancer for 2023–2027, aimed at expanding access to targeted and immuno-oncology therapies, high dependence on imported supplies and uneven drug supply across regions persist. This highlights the need for further improvement of regulatory mechanisms, including streamlining registration procedures, expanding pharmacoeconomic assessment tools when deciding on drug inclusion in reimbursement systems, and creating incentives for localizing oncology drug production.

Current oncology situation in Kazakhstan

Epidemiological analysis shows persistently high cancer prevalence and mortality. Over 37,000 new cases registered annually; outpatient patients exceed 205,000. Cancer mortality ranks second; lung, stomach, colorectal, breast cancers lead mortality, breast cancer leads incidence. 55.8% of patients are working age, increasing socioeconomic impact and healthcare demands. State programs improved indicators: 2018–2022 Comprehensive Plan reduced mortality 15%, early detection 29.0%, five-year survival 55.3%, but regional disparities and late-stage diagnoses remain. Findings show oncology situation directly impacts pharmaceutical market, justifying comprehensive marketing and pharmacoeconomic analysis.

International experience in cancer control

Global studies show rising incidence and mortality require prevention, early diagnosis, access to modern drugs. Anticancer drug sales differ by country development: high-income countries see growth in innovative chemotherapeutics and targeted drugs; developing countries rely on inexpensive cytostatics (Petrukhina et al., 2023). Oxaliplatin market in Russia shows limited dosage forms due to budgets and regulations (Gopienko & Zyryanov, 2024). WHO and European strategies link access to innovative drugs with government pricing and subsidies, affecting survival (Bray et al., 2018; Allemani et al., 2017; Sullivan et al., 2019). In Central Asia and Eastern Europe, cross-sector collaboration improves market forecasting and procurement (Rikhsiyeva & Rajabova, 2025; Melnikov & Melnikova, 2021). Global initiatives like Canada's national plans, US Cancer Moonshot, and European data projects show prevention, digital registries, and monitoring improve survival (Bray et al., 2024; Hanna et al., 2020; Wild et al., 2020). Evidence-based protocols and harmonization programs, including ICGC and TCGA, optimize drug choice and improve survival (Hudson et al., 2010; Weinstein et al., 2013; Ley et al., 2008). Immunotherapy meta-studies show checkpoint inhibitors improve long-term outcomes in melanoma and NSCLC (Topalian et al., 2012; Robert et al., 2015). WHO programs emphasize adapting recommendations for low- and middle-income countries to reduce global mortality (Farmer et al., 2010).

The pharmaceutical market for drugs used in oncological diseases is being reshaped by a rapid influx of innovative targeted therapies that go beyond conventional cytostatics and offer enhanced specificity and therapeutic benefit; recent advances in the design and clinical application of antibody-drug conjugates (ADCs) demonstrate how next-generation molecular constructs can deliver cytotoxic agents directly to tumor cells, improving efficacy while potentially reducing systemic toxicity (Beylerli et al., 2025; Wu et al., 2025), and extensive reviews of PI3K-based anticancer agents highlight the growing importance of small-molecule inhibitors in disrupting key oncogenic signaling pathways (Ashadul et al., 2025); moreover, research into emerging targeted modalities such as bispecific antibodies and novel receptor-directed constructs underscores expanding therapeutic options in solid and hematologic malignancies (Turner et al., 2025; Khorsandia et al., 2025), while precision oncology frameworks integrating multi-omics data are enhancing the predictive modeling of targeted drug responses and comprehensive analyses of ADCs outline both their current clinical impact and challenges in optimizing target selection and payload delivery (Wu et al., 2025).

Analysis of the range and structure of the pharmaceutical market for oncology drugs in the Republic of Kazakhstan

The pharmaceutical market for oncology drugs is characterized by a high degree of clinical and economic significance, driven by the rising incidence of malignant neoplasms, the expanding use of

innovative drugs, and increasing budget expenditures on medications for cancer patients. A comprehensive analysis of the range, dosage forms, countries and manufacturers, as well as the procurement structure and supply segments, allows us to identify key trends in market development, the degree of its import dependence, and priority areas of state policy in the area of drug provision for oncology care.

According to data from the Kazakhstan National Drug Formulary and a review by Zhetesbayeva & Tulebayev (Zhetesbayeva & Tulebayev, 2025; knf.kz), oncology drugs in the ATC classification are represented by four main pharmacological groups. The distribution of drugs by ATC groups and subgroups, as well as by International Nonproprietary Names (INN) and trade names, is shown in Table 1.

Table 1. Distribution of oncological drugs by pharmacological groups and ATC classification

No.	Pharmacological group	Number of subgroups according to ATC classification	Number of INN or compositional variations	Of these, the number of INN of orphan drugs	Number of trade names
1	L01 Antineoplastic agents	35 subgroups	120	38	339
2	L02 Antineoplastic hormonal drugs (endocrine therapy)	5 subgroups	16	0	56
3	L03 Immunomodulating agents	3 subgroups	18	4	25
4	L04 Immunosuppressive agents	5 subgroups	40	21	193
	Total	48	194	63	613

The analysis of the data in Table 1 shows that the pharmaceutical market of oncology drugs in the Republic of Kazakhstan is characterized by a high structural concentration in the group L01 «Antineoplastic agents», which accounts for the largest number of ATC subgroups (35), international nonproprietary names (120) and trade names (339), including a significant share of orphan drugs (38 INN), which emphasizes its key role in the specialized therapy of malignant neoplasms and the formation of the main drug load; at the same time, the groups L04 «Immunosuppressive agents» and L02 «Antineoplastic hormonal drugs (endocrine therapy)» are characterized by a smaller assortment, but high clinical significance, and the relatively limited representation of the group L03 «Immunomodulating agents» reflects their auxiliary role in oncological practice, collectively indicating a complex and multi-level structure of drug provision for cancer patients.

Analysis of oncology drug dosage forms

An analysis of the anticancer drug portfolio by dosage form revealed a predominance of parenteral formulations, driven by the clinical characteristics of modern oncology therapy, which focuses on systemic and infusion treatment. Within two key ATC groups (L01 and L03), 377 trade names were analyzed, of which 186 were parenteral formulations, significantly exceeding the share of oral and topical medications. The oral segment is represented primarily by tablets (84) and capsules (53), while topical formulations (suppositories, nasal and soft forms) are limited in distribution and are used primarily as adjunctive therapy. Overall, the portfolio is characterized by a predominance of liquid and solid dosage forms, with a minimal share of soft forms.

1) Proportion of dosage forms by aggregated categories (by consistency)

Liquid dosage forms predominate in the structure of the anticancer drug product mix, accounting for 54.3%, followed by solid dosage forms at 43.0%, while soft dosage forms account for only 2.7%, reflecting the priority of systemic and infusion therapy in oncology practice (Fig. 1).

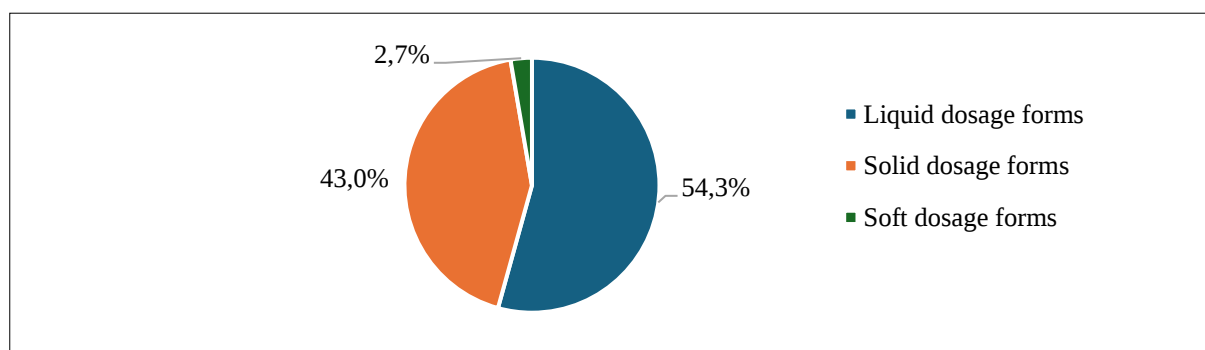


Figure 1 – Proportion of dosage forms by state of aggregation

2) Proportion of dosage forms by route of administration (by method of use)

The distribution of dosage forms by route of administration indicates a predominance of parenteral drugs (50.0%), with a significant share of oral forms (38.7%) and a relatively low representation of topical forms (11.3%), emphasizing the leading role of inpatient treatment and chemotherapy regimens in the structure of oncology care (Fig. 2).

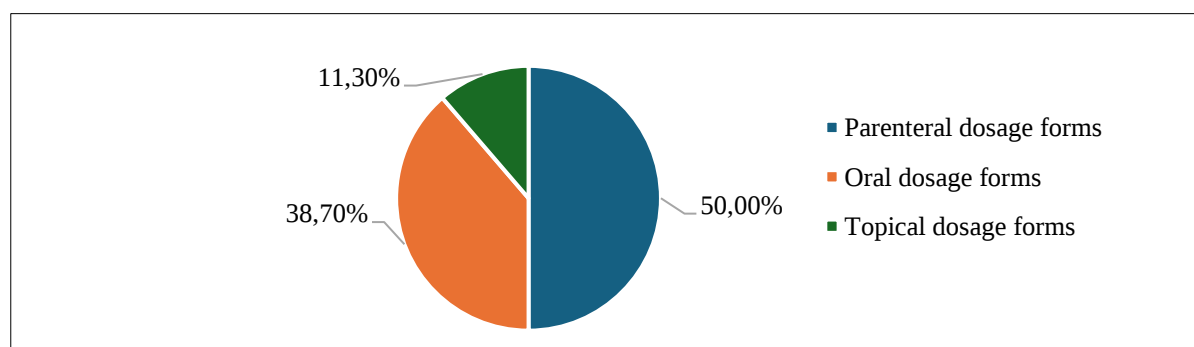


Figure 2 – Proportion of dosage forms by route of administration

3) Proportion of types of injectable dosage forms

Within the parenteral drug segment, the largest share is occupied by concentrates for the preparation of infusion solutions (41.4%), followed by injection solutions (29.6%), lyophilisates (18.8%), and powders for the preparation of solutions (10.2%), indicating the predominance of infusion technologies for the treatment of malignant neoplasms (Fig. 3).

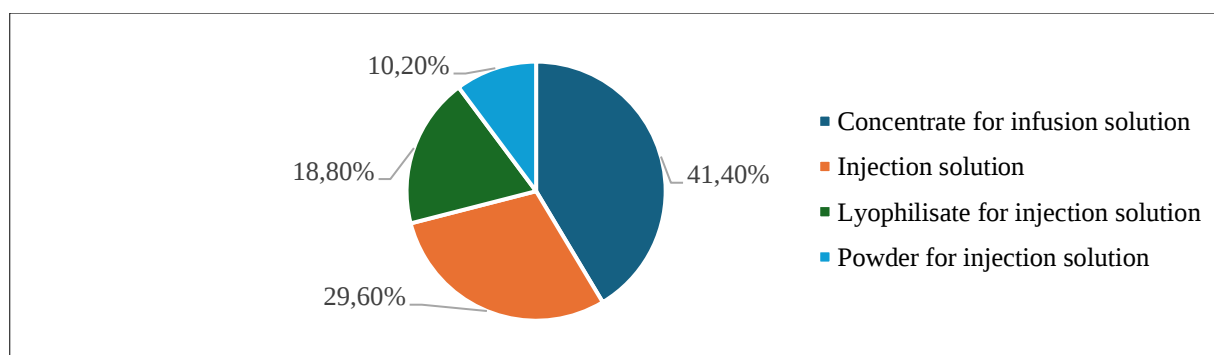


Figure 3 – Proportion of types of injectable dosage forms

4) Proportion of oral dosage forms

The composition of oral anticancer drugs is characterized by a predominance of tablet forms (58.3%), with a significant share of capsules (36.8%) and minimal representation of liquid oral forms (4.9%), reflecting the market's focus on convenient forms of long-term outpatient therapy (Fig. 4).

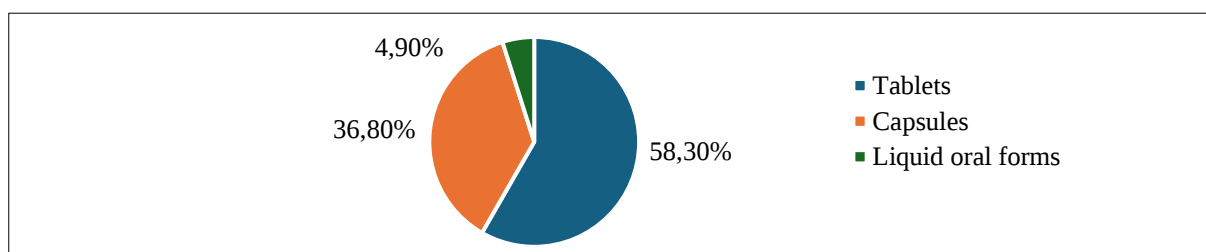


Figure 4 – Proportion of oral dosage forms

Countries and manufacturers of oncology drugs

5) Top 10 manufacturing countries by number of trade names

An analysis of the market structure by country of origin revealed that the pharmaceutical market for oncology drugs in the Republic of Kazakhstan is formed by supplies from 25 countries.

The share of domestic drugs by number of trade names is 17.2%, while imported products account for 82.8%.

Germany (19%) and Russia (18%) hold the leading positions, with Kazakhstan ranking third (17%), indicating the gradual development of local production and the implementation of import substitution policies. India and Switzerland also play a significant role, and the geographic diversification of the market highlights its high dependence on external supplies, particularly in the innovative drug segment (Figure 5).

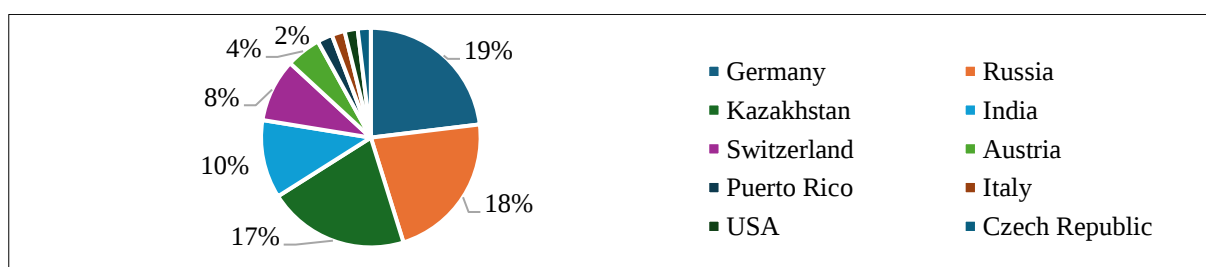


Figure 5 – Top 10 manufacturing countries by number of trade names

6) Top 10 pharmaceutical manufacturers by number of trade names

The portfolio of oncology drugs analyzed is comprised of 113 manufacturers.

The largest share of trade names is provided by domestic companies Kelun-Kazpharm LLP, Nobel Almaty Pharmaceutical Factory JSC, and Karaganda Pharmaceutical Complex LLP, with a significant presence of international corporations Baxter, Sandoz, Roche, Pfizer, and Johnson & Johnson, reflecting a mixed market model involving local and global manufacturers (Figure 6).

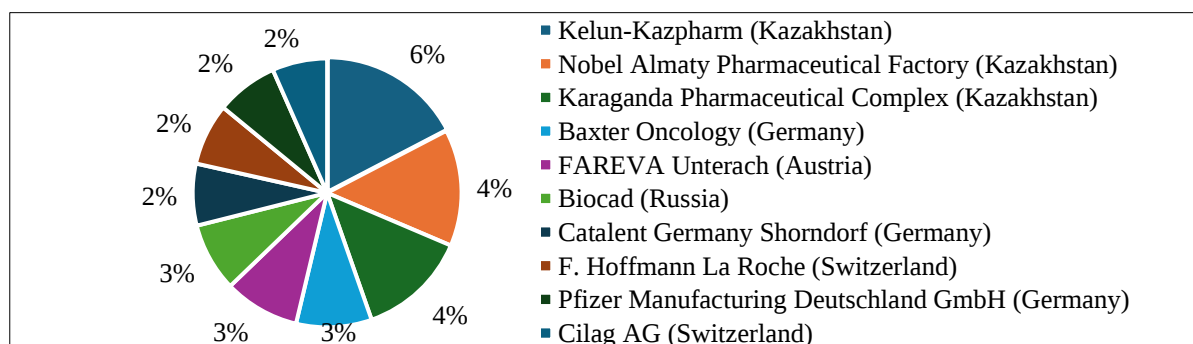


Figure 6 – Top 10 pharmaceutical manufacturers by number of trade names

Oncology drug supply and procurement structure

7) Market structure by supply segment (by number of trade names)

The largest share of the product range is in the price purchase (price-based procurement) segment

(50%), followed by the inpatient segment (33%) and outpatient supply (17%), indicating the key role of centralized procurement in the drug supply system for oncology patients (Figure 7).

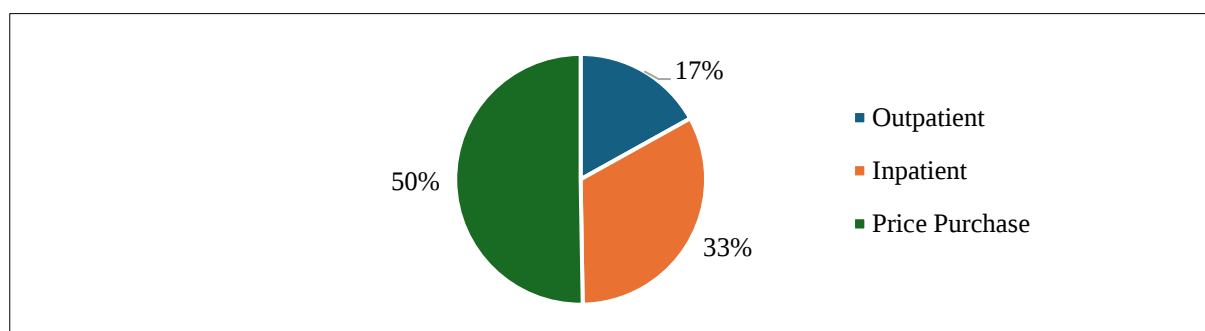


Figure 7 – Market structure by oncology drug supply segments (by number of trade names)

8) Analysis of supply segments by purchase volume (in physical and value terms)

In physical terms, the price purchase segment leads (68.2% of packages), but in value terms, the inpatient segment dominates (75.8 billion tenge), indicating a concentration of the most expensive drugs in the inpatient healthcare system (Figure 8).

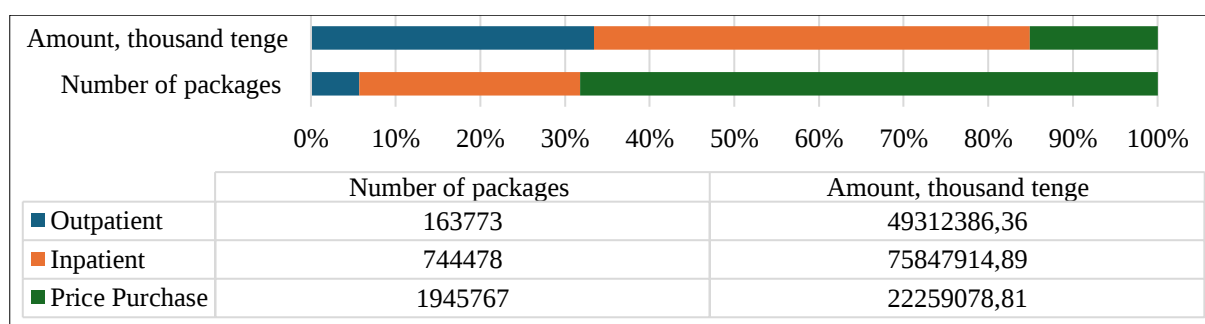


Figure 8 – Structure of supply segments by purchase volume (in physical and value terms, October 2025)

9) Analysis of the procurement segment at wholesale and retail prices

Despite the predominance of segment R (Retail, Sell In) in terms of the number of packages (66.5%) at wholesale prices, the majority of financial costs (96%) fall on segment G (Government, Tender) at retail prices, reflecting the high cost of innovative drugs purchased under the state drug supply program (Table 2).

Table 2. Segment of procurement of oncological drugs at wholesale and retail prices

Segment	Number of packages, pcs	Share in the segment by number of packages, %	Purchase amount, thousand tenge	Share in the segment by purchase amount, %
R - Retail, wholesale price (Sell In)	1 896 815	66,5%	6 615 719.70	4%
G - Government, retail price (Tender)	957 203	33,5%	140 803 660.35	96%
Total	2 854 018	100%	147 419 380.05	100%

10) Analysis of pharmacological groups by purchase volume

In physical terms, the largest volume of consumption falls on other groups of drugs used in oncology, accounting for 3.9 million units (58.3% of the total volume). However, in monetary terms, the leading position is occupied by «Antineoplastic agents» of the L01 group, which account for 137.8

billion tenge, forming the main financial burden of the healthcare system (Fig. 9).

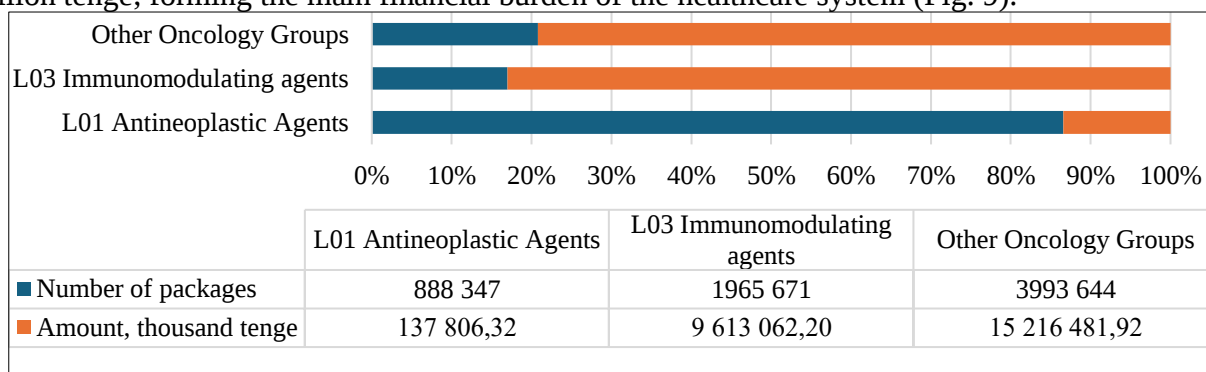


Figure 9 – Distribution structure of pharmacological groups of oncology drugs by purchase volume

Leading trade names in purchases

11) Top 10 trade names by purchase amount

Table 3 demonstrates the concentration of budget expenditures on a limited number of expensive, innovative targeted and immuno-oncology drugs, which constitute the main financial burden on the healthcare system.

Innovative targeted and immuno-oncology drugs, primarily «Keytruda» (INN: pembrolizumab, concentrate for infusion solution, 25 mg/ml, 4 ml) and «Tagrisso» (INN: osimertinib, film-coated tablets, 80 mg), hold leading positions in terms of funding volume, while domestically produced drugs are also included, reflecting the high budgetary burden of innovative therapies and the growing role of local manufacturers (Table 3).

Table 3. Top 10 trade names of oncology drugs by purchase amount

No.	Trade name (INN)	Manufacturer	Corporation	Country	Amount, in thousands of tenge	Quantity of packages
1	Keytruda (Pembrolizumab)	MSD Ireland (Carlow)	Merck Sharp & Dohme Idea, Inc.	Ireland	13 539 340,6	10 056
2	Tagrisso (Osimertinib)	AstraZeneca AB	AstraZeneca	Sweden	8 497 036,9	2 754
3	Bevacizumab (Bevacizumab)	KPhK	KPhK	Kazakhstan	6 586 225,8	17 789
4	Imbruvica (Ibrutinib)	Cilag AG	Johnson & Johnson	Switzerland	5 899 636,5	2 272
5	Jakavi (Ruxolitinib)	Novartis Pharma Stein	Novartis	Switzerland	5 838 369,2	4 186
6	Perjeta (Pertuzumab)	Roche Diagnostics	F.Hoffmann La Roche AG	Germany	4 876 102,0	4 751
7	Herceptin (Trastuzumab)	F.Hoffmann La Roche	F.Hoffmann La Roche AG	Switzerland	4 154 986,6	9 656
8	Pembroria (Pembrolizumab)	KPhK	KPhK	Kazakhstan	3 778 109,7	3 683
9	Adcetris (Brentuximab)	BSP Pharmaceuticals	Takeda	Italy	3 602 529,0	2 723
10	Darzalex (Daratumumab)	Cilag AG	Johnson & Johnson	Switzerland	3 508 859,5	4 590

The rating in Table 3 includes products from leading international corporations (Merck, AstraZeneca, Roche, Novartis, Johnson & Johnson, Takeda), as well as domestically produced drugs (Bevacizumab, Pembroria) from Karaganda Pharmaceutical Complex LLP, which reflects the high financial burden of innovative therapy on the healthcare budget, while the role of local manufacturers

in the anti-cancer drug segment is growing. The simultaneous presence of domestically produced drugs reflects the positive dynamics of local production, but the continued dominance of products from international companies indicates the market's high dependence on imported supplies.

12) Top 10 trade names by number of packages

Classic cytostatic drugs, characterized by low unit costs, lead in terms of purchase volume per package, while biological drugs account for the largest financial costs, with relatively smaller purchase volumes (Table 4).

Table 4 reflects the dual structure of the pharmaceutical market for oncology drugs in the Republic of Kazakhstan, where classical cytostatic agents, widely used in standard chemotherapy regimens and characterized by low unit costs, predominate in volume terms. High procurement volumes of fluorouracil, oxaliplatin, cyclophosphamide, cisplatin, and gemcitabine indicate their key role in meeting the current needs of oncology hospitals, while the significant presence of domestically produced drugs from Kelun-Kazpharm LLP indicates the contribution of local manufacturers to reducing import dependence in the basic therapy segment. At the same time, the pronounced gap between volume and cost indicators, as exemplified by «Erbix» (cetuximab), demonstrates that biological and targeted drugs, purchased in smaller volumes, create a disproportionately high financial burden on the healthcare system, underscoring the need for pharmacoeconomically sound public procurement planning.

Table 4. Top 10 trade names of oncology drugs by purchase volume in packages

No.	Trade name (INN)	Manufacturer	Corporation	Country	Quantity of packages	Amount, in thousands of tenge
1	Cytoflu (Fluorouracil, 10ml)	Cytopharma	Cytopharma	Tunisia	100 506	318 485.83
2	Oxaliplatin Kelun-Kazpharm (Oxaliplatin)	Kelun-Kazpharm	Kelun-Kazpharm	Kazakhstan	54 256	201 039.63
3	Cytoflu (Fluorouracil, 5 ml)	Cytopharma	Cytopharma	Tunisia	53 960	131 523.72
4	Hydroxycarbamide (Hydroxycarbamide)	Belmedpreparaty RUE	Belmedpreparaty RUE	Belarus	36 198	104 682.04
5	Cytomed-100 (Cytarabine)	Adley Formulations	Adley Formulations	India	31 657	27 711.27
6	Cisplatin Kelun-Kazpharm (Cisplatin)	Kelun-Kazpharm	Kelun-Kazpharm	Kazakhstan	30 195	78 487.67
7	Cyclophosphamide Kelun-Kazpharm (Cyclophosphamide)	Kelun-Kazpharm	Kelun-Kazpharm	Kazakhstan	29 473	38 284.24
8	Zuvidox 50 (Doxorubicin)	Zuvius Lifesciences	Zuvius Lifesciences	India	26 892	80 123.90
9	Gemcitabine Kelun-Kazpharm (Gemcitabine)	Kelun-Kazpharm	Kelun-Kazpharm	Kazakhstan	26 608	56 228.82
10	Erbix (Cetuximab)	Merck Healthcare KGaA	Acino Pharma	Germany	23 337	2777 130.05

An analysis of oncology drug purchases (Table 4) in Kazakhstan over the recent period showed that the top 10 trade names by purchase volume per package are «Cytoflu» (Fluorouracil, 10 ml) from Tunisia, «Oxaliplatin Kelun-Kazpharm» (Kazakhstan), and «Cytoflu» (Fluorouracil, 5 ml), with purchases of over 50,000 packages. «Erbix» (Cetuximab, Germany) accounted for the largest total cost, amounting to 2.7 billion tenge, despite a smaller purchase volume.

Pharmacoeconomic evaluation of cancer treatment

Pharmacoeconomic analysis of cancer treatment costs is a key tool for assessing the financial

burden on the healthcare system, especially with the expanding range of targeted and immuno-oncology drugs characterized by high cost and long-term use. Comparing treatment costs for different groups of oncology drugs helps identify structural imbalances in spending, substantiate priorities for public drug provision, and assess the potential for optimizing procurement policies.

The average cost of a treatment course was calculated based on instructions for medical use and clinically accepted treatment regimens for the most common indications, using the following standardized assumptions:

- Average patient: body weight 70 kg, body surface area 1.8 m²;
- Calculation based on one standard course of therapy (one cycle or one month of treatment), depending on recommendations;
- Average procurement prices based on actual data for 2025 were used;
- Overruns and drug residues in the vial were not taken into account (conservative approach).
- Combination therapy regimens were not included (monotherapy assessment).

The cost of one package and the average cost of one course of treatment for the top-10 oncology drugs, based on procurement volume in 2025, are presented in Table 5.

Table 5. Cost of 1 package and average cost of 1 course of treatment for the top-10 oncology drugs (based on procurement volume in 2025)

No.	Trade name (INN)	Dosage form and standard treatment regimen*	Cost of 1 package, thousand tenge	Average dose per course	Cost of 1 course of treatment, thousand tenge
1	Keytruda (Pembrolizumab)	Infusion concentrate, 200 mg every 3 weeks	1 346.4	1 bottle	1 346.4
2	Tagrisso (Osimertinib)	80 mg tablets daily (30 days)	3 085.3	1 pack	3 085.3
3	Bevacizumab (Bevacizumab)	Infusion solution, 5 mg/kg every 2 weeks	370.2	1 bottle	370.2
4	Imbruvica (Ibrutinib)	420 mg capsules daily (30 days)	2 596.7	1 pack	2 596.7
5	Jakavi (Ruxolitinib)	20 mg tablets twice daily (30 days)	1 394.7	1 pack	1 394.7
6	Perjeta (Pertuzumab)	Infusion concentrate, 420 mg every 3 weeks	1 026.3	1 bottle	1 026.3
7	Herceptin (Trastuzumab)	Infusion lyophilisate, 6 mg/kg every 3 weeks	430.3	1 bottle	430.3
8	Pembroria (Pembrolizumab)	Infusion concentrate, 200 mg every 3 weeks	1 025.8	1 bottle	1 025.8
9	Adcetris (Brentuximab)	Infusion lyophilisate, 1.8 mg/kg every 3 weeks	1 323.0	1 bottle	1 323.0
10	Darzalex (Daratumumab)	Infusion concentrate, 16 mg/kg (maintenance, 1 month)	~1 500.0	1–2 bottles	~1 500.0

**Note: Calculations are based on the average patient (body weight 70 kg, body surface area 1.8 m²) and instructions for medical use and standard clinical patterns.*

Analysis of the data in Table 5 revealed that the average cost of one course or one month of treatment for oncology drugs varies widely – from 370,000 tenge (bevacizumab) to over 3.0 million tenge (osimertinib). Targeted and immuno-oncology drugs, primarily used within the state drug supply system and characterized by high unit dose costs for long-term use, pose the greatest financial burden.

The cost per package and average cost per course of treatment for the top 10 oncology drugs by number of packages purchased as of 2025 are presented in Table 6.

The pharmacoeconomic assessment reveals significant heterogeneity in cancer treatment costs: classic cytostatic drugs (fluorouracil, cisplatin, cyclophosphamide, cytarabine) are characterized by extremely low costs per course of therapy—in the range of 6,000–25,000 tenge, while the use of

biological drugs and monoclonal antibodies (cetuximab, pembrolizumab, osimertinib) increases the cost of treatment to hundreds of thousands and even millions of tenge.

In particular, the difference between the minimum and maximum cost of a single course of treatment among the drugs presented exceeds 150 times—from less than 6,000–25,000 tenge for basic cytostatics to almost 1.0 million tenge for biological drugs, clearly demonstrating the scale of pharmacoeconomic differentiation within the oncology drug segment.

Table 6 illustrates the pharmacoeconomic differences between the most frequently purchased drugs in physical terms and allows one to assess the financial burden not through supply volumes, but through the cost of a standard course of treatment for one patient. The presented data emphasize that the high frequency of procurement of individual drugs does not equate to their economic significance for the healthcare system, as it is the cost of a course of treatment that determines the actual level of budget expenditures for clinical use. This approach allows one to distinguish between basic chemotherapy drugs, which provide mass treatment at minimal cost, and drugs with a high per-course price, which require prioritization and pharmacoeconomic justification for inclusion in state drug provision programs.

Table 6. Cost of 1 package and the average cost of 1 course of treatment of the main oncological drugs (based on purchase data in packages, 2025)

No.	Trade name (INN)	Dosage form and standard treatment regimen*	Cost of 1 package, thousand tenge	Average dose per course	Cost of 1 course of treatment, thousand tenge
1	Cytoflu (Fluorouracil, 10ml)	Injection solution, 500 mg/vial; 500 mg/day for 5 days	3.17	5 bottles	15.9
2	Oxaliplatin Kelun-Kazpharm (Oxaliplatin)	Lyophilisate 100 mg; 85 mg/m ² once every 2 weeks	3.71	2 bottles	7.4
3	Cytoflu (Fluorouracil, 5 ml)	Injection solution, 250 mg/vial; 500 mg/day for 5 days	2.44	10 bottles	24.4
4	Hydroxycarbamide (Hydroxycarbamide)	Capsules 500 mg; 1–2 g/day (30 days)	2.89	2 pack	5.8
5	Cytomed-100 (Cytarabine)	Solution 100 mg; 100 mg/day for 7 days	0.88	7 bottles	6.1
6	Cisplatin Kelun-Kazpharm (Cisplatin)	Solution 50 mg; 75 mg/m ² once every 3 weeks	2.60	3 bottles	7.8
7	Cyclophosphamide Kelun-Kazpharm (Cyclophosphamide)	Lyophilisate 200 mg; 600 mg/m ² once	1.30	6 bottles	7.8
8	Zuvidox 50 (Doxorubicin)	Solution 50 mg; 60 mg/m ² once	2.98	3 bottles	8.9
9	Gemcitabine Kelun-Kazpharm (Gemcitabine)	Lyophilisate 1000 mg; 1000 mg/m ² (days 1 and 8)	2.11	4 bottles	8.4
10	Erbitux (Cetuximab)	Concentrate 100 mg; 400 mg/m ² (load)	118.99	8 bottles	951.9

*Note: Calculations are based on the average patient (body weight 70 kg, body surface area 1.8 m²) and standard clinical guidelines.

Thus, the data in Table 6 demonstrate that despite the predominance of classical cytostatic agents in procurement volumes due to their low unit cost and widespread clinical use, the overall financial burden of oncology drug therapy is primarily driven by a limited number of innovative biological and targeted medicines, for which the cost of a standard treatment course is tens to hundreds of times higher, underscoring the need to evaluate procurement priorities and budget planning not by physical volumes alone but by the pharmacoeconomic impact of treatment per patient.

This pharmacoeconomic asymmetry explains the concentration of budget expenditures on a limited list of high-cost drugs and highlights the need for a comprehensive approach to procurement planning, the introduction of biosimilars, and the rationalization of drug supply regimens in oncology.

4. Conclusion

The study provided an overview of Kazakhstan's oncology drug market, considering regulatory, epidemiological, market, and pharmacoeconomic aspects. The market operates within complex legal frameworks ensuring access through GFMC, CSHIS, and centralized procurement. Oncology remains a significant medical and social burden, with rising incidence, many working-age patients, and high healthcare costs. Kazakhstan follows global trends in targeted and immuno-oncology therapies but relies heavily on imported innovative drugs. The market is dominated by pharmacological group L01, parenteral dosage forms, and infusion therapies, with high concentration in public procurement. Domestic companies are growing, yet international corporations retain leading positions. Most budget expenditures target a limited list of expensive drugs, and treatment costs show strong asymmetry between traditional cytostatics and biological therapies.

The study found that the pharmaceutical market for oncology drugs in the Republic of Kazakhstan includes 613 trade names related to 194 international nonproprietary names, grouped into 48 ATC classification subgroups. Leading position is occupied by group L01 «Antineoplastic agents», accounting for 339 trade names and 120 INNs, including 38 orphan drugs. Analysis of dosage forms revealed dominance of liquid forms (54.3%) and parenteral administration (50.0%), reflecting focus on inpatient therapy. In market structure by country of origin, share of imported drugs reached 82.8%, while domestic manufacturers accounted for 17.2%. By supply segment, 50% of trade names were related to government procurement, 33% to inpatient, and 17% to outpatient supply. In physical terms, 2.85 million packages of oncology drugs were purchased in 2025, with 68.2% acquired through price-based procurement, while inpatient procurement dominated in value terms, totaling 75.8 billion tenge. Analysis by price segment showed that, despite accounting for 33.5% of packages, government procurement formed 96% of total expenditures. Pharmacoeconomic assessment revealed that cost of a single treatment course varied more than 150-fold – from 6,000-25,000 tenge for classic cytostatics to almost 1.0 million tenge for biological drugs, clearly reflecting concentration of budgetary pressure on a limited number of innovative oncology medicines.

The study demonstrates practical value for healthcare management by providing evidence to optimize oncology drug procurement priorities, adjust drug lists within guaranteed medical care and compulsory health insurance programs, and rationalize budget allocation based on the cost of standard treatment courses. Future research should focus on detailed pharmacoeconomic evaluations of specific regimens, budget impact analyses, and assessment of risk-sharing mechanisms to support sustainable access to innovative anticancer therapies.

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Conflict of Interest

The authors declare no conflicts of interest.

Author Contributions

Ye. Tulebayev - concept, methodology, and conclusions; Sh. Zhetsbayeva - data analysis; V. Ossintsev - primary data collection and analysis on oncology drugs; R. Rafael - text analysis, editing, and translation; G. Karabayeva - literature review and statistical data analysis.

Data availability

The data used in this article are available upon request from the authors.

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