

ANALYSIS OF PROVIDING HOSPITAL-REPLACING CARE IN SYSTEMIC TREATMENT OF CANCER PATIENTS AT ALMATY ONCOLOGY CENTER

**R.K. USKENBAEVA¹, Zh.B. KALPEEVA¹, N.A. IZBAGAMBETOV²,
R.O. BOLATBEKOVA², Sh.T. PAZYLOV²**

¹Satbayev Kazakh National Technical University, Almaty, the Republic of Kazakhstan;

²Almaty Oncology Center, Almaty, the Republic of Kazakhstan

ABSTRACT

Relevance: According to the statistics and reporting documentation, 23,732 cases of cancer were treated at Almaty Oncology Center (AOC) in 2024, with 69.8% of services provided by Day Patient Radiation Therapy and Chemotherapy Departments of the Center. The concept of AOC development envisions the expansion of patients' access to hospital-substituting forms of medical care. In this context, analyzing the activities of the day hospital for chemotherapy is an important area that contributes to the improvement of care organization for cancer patients in outpatient settings.

The study aimed to analyze the performance of the Almaty Oncology Center's Day Patient Chemotherapy Department from 2019 to 2024.

Methods: The Day Patient Chemotherapy Department performance analysis relied on primary reporting and documentation forms. Key indicators such as the number of hospitalized patients and recorded adverse events were extracted from the Damumed electronic medical record system. The study was part of the framework of the IRN BR24993051 project.

Results: During the study period, the number of patients admitted to the AOC Day Patient Chemotherapy Department increased by 124.17% due to the growth in the registration of new cancer cases in Almaty and the transition to hospital-replacing care. The average stay increased by 38% over five years, primarily due to the expansion of chemotherapy regimens in line with national diagnostic and treatment protocols for cancer patients in Kazakhstan. The number of adverse events has also increased from 602 to 18,202 cases, corresponding with the rise in the number of patients over the past 5 years (2019-2024).

Conclusion: The performance analysis of the Day Patient Chemotherapy Department highlights the need to enhance the department's staffing capacity, increase the number of available beds, and implement electronic queue systems. It is also necessary to enhance outpatient care for patients experiencing adverse events, which places a significant burden on the AOC Day Patient Chemotherapy Department personnel.

Keywords: inpatient replacement care, chemotherapy, cancer center.

Introduction: According to the Order of the Minister of Health and Social Development of the Republic of Kazakhstan dated June 7, 2023 No. 106, under sub-item 95), item 1, Art. 7 of the Code of the Republic of Kazakhstan "On the health of the people and the health care system" dated September 18, 2009, the creation of organizational conditions for increasing the availability of modern medical care for cancer patients, taking into account the resource capabilities of the state, is the concept and key point in the development of healthcare in the field of oncology in Kazakhstan [1].

According to international recommendations, global health care needs to be restructured to reduce the excess number of inpatient beds and simultaneously increase the number of less expensive day care beds [2].

According to the data from the National Cancer Registry, as of January 2025, 231,019 people were registered with malignant neoplasms (MN) in the Republic of Kazakhstan. In 2024, 40,148 people with cancer were registered for the first time in the country, with women accounting for 55.5% (23,406) of cases and men for 44.5% (17,887). In 2024, 12,703 fatal cases were registered [3].

In Almaty, according to the National Cancer Registry, 5,209 people were registered with newly diagnosed malignant neoplasms as of January 1, 2025, and 1,356 cases were fatal [4]. Almaty is among the regions with the highest incidence rates, above the national average.

According to the Almaty Oncology Center (AOC) Statistics Department and reporting documentation, 23,732 cases of malignant neoplasms were treated at the Center in 2024, with Day Patient Radiation Therapy and Chemotherapy Departments accounting for 69.8% of all cases of care.

The AOC development concept includes expanding patient care through inpatient replacement services [5, 6]. In this regard, studying the work of the Day Patient Chemotherapy Department is a crucial step in expanding care for cancer patients as an alternative to inpatient services.

The study aimed to analyze the performance of the Almaty Oncology Center's Day Patient Chemotherapy Department from 2019 to 2024.

Material and Methods: The analysis of the work of the Day Patient Chemotherapy Department was carried out

using the main accounting and reporting forms of documentation:

Updated information from official reports of regional oncology dispensaries - "Report on malignant neoplasms" (accounting form No. 7) for the city of Almaty for 2019 and 2024;

Card of a patient with a diagnosis of malignant neoplasm established for the first time in life (registration form 090/U);

030-6/y "Dispensary observation checklist";

Data from the National Cancer Registry (Electronic Registry of Cancer Patients) on malignant neoplasms;

International Classification of Diseases, 10th revision (ICD-10), on localizations.

Figures of the number of hospitalized patients and registered adverse events (AEs) were obtained from the "Damumed" electronic medical records database.

The study was conducted within the framework of the research scientific project BR24993051 on the topic "Development of an intelligent urban system based on IoT and data analysis" to assess the current situation of inpatient replacement care at the AOC.

Results: Over the analyzed period, the number of patients in the Day Patient Chemotherapy Department of the AOC increased by 124.17% due to the growth in the number of new cancer cases registered in Almaty, as well as the transition of AOC to inpatient replacement care (Table 1). The average stay of patients over the past 5 years has increased by 38% due to the expansion of chemotherapy options (the introduction of new drugs in Kazakhstan, expansion of the list of chemotargeted and immunotherapy drugs) used according to the protocol for cancer diagnostics and treatment in the Republic of Kazakhstan.

Table 1 – Number of patients with malignant neoplasms treated in the Day Patient Chemotherapy Department of the AOC for 2019, 2022, and 2024, abs.

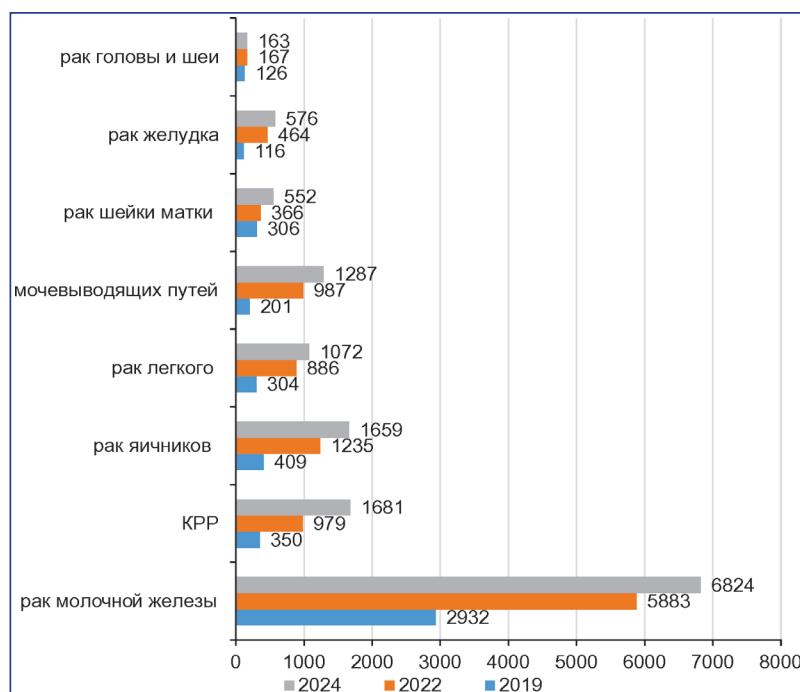
Indicator	Years			
	2019	Growth, %	2022	Growth, %
Patients discharged	6857	78.2	12217	25.8
Bed days	42452	142.5	102947	48.9
Average patient stays, days	6.2	35.5	8.4	19
				10

The expansion of staffing in the Day Hospital Chemotherapy Department is worth noting (see Table 2). The need to expand the staffing of medical, nursing, and registration personnel (those who enter data into the electronic system) was justified.

In terms of treatment, the admission rate for main nosologies has increased significantly over the analyzed period, by more than 100% (Figure 1). Worth noting that patients with blood system diseases or advanced cases were referred for treatment to a 24-hour chemotherapy hospital.

Table 2 – Staffing of the Day Patient Chemotherapy Department for 2019 and 2024, abs.

Indicator	Years	
	2019	2024
Doctors	11	15
Nursing staff	9	14
Paramedical personnel	4	3
Registrars	2	3
Total	26	35



Cancer nosologies (top to bottom): Head and Neck; Stomach; Cervix; Urinary Tract; Lung; Ovary; CRC; Mammary Gland
 Figure 1 – Comparison of the number of patients by nosology, 2019, 2022, and 2024

In 2024, 18,202 AEs were registered in patients receiving chemotherapy at the Day Patient Chemotherapy Department. Most (92%) were grade I AEs, which is a 37.7% increase compared to 2019.

The trend analysis revealed several factors contributing to the increase in AE registration. Firstly, the introduction of digital recording and monitoring systems provided a more comprehensive and detailed registration of side effects, including mild clinical manifestations that could previously remain undocumented or underestimated, resulting in a significant impact. Strengthening pharmacovigilance, increasing alertness of medical personnel, and improving the quality of outpatient monitoring also contributed to the increase in the detection of AEs.

Additionally, in 2024, there was a wider use of high-intensity and heavy chemotherapy regimens with significant toxicity. This was reflected in an increase in the number

of grades II–IV AEs, particularly neutropenia (2,745 cases), nausea and vomiting (7,868 cases), and diarrhea (6,695 cases). It should be taken into account that one patient could experience several different AEs during treatment, which also increases the total number of AEs recorded. For example, one patient could simultaneously experience neutropenia, nausea, and toxic hepatitis, each of which was recorded as a separate AE.

In 2024, 113 grade IV AEs were registered. This fact requires special attention in the context of individual risk assessment when prescribing toxic treatment regimens and the need for timely correction of therapy.

Thus, the increase in the total number of AEs in 2024 was most likely associated with an objective increase in the toxic burden on patients resulting from the use of more aggressive chemotherapy regimens, as well as an improvement in the AE recording system due to the digitalization of clinical practice (Tables 3, 4).

Table 3 – Adverse events in patients after chemotherapy in the Day Patient Chemotherapy Department in 2019, abs.

Side effects	Grade 0	Grade I	Grade II	Grade III	Grade IV
Leukopenia	-	176	159	13	-
Anemia	-	-	-	-	-
Thrombocytope-nia	-	-	-	35	-
Diarrhea	-	42	25	-	-
Nausea	-	92	31	-	-
Vomit	-	18	11	-	-
Cardiotoxicity	-	-	-	-	-
Toxic hepatitis	-	-	-	-	-
Total	-	328	226	48	-

Table 4 – Adverse events in patients after chemotherapy in the Day Patient Chemotherapy Department in 2024, abs.

Side effects	Grade I	Grade II	Grade III	Grade IV
Neutropenia	-	2488	211	46
Anemia	-	104	25	1
Thrombocytopenia	-	119	21	8
Nausea, vomiting	-	7023	845	-
Diarrhea	-	6580	103	12
Neurotoxicity and phlebitis	-	18	19	-
Allergic	-	28	3	-
Cardiotoxicity	-	-	3	-
Toxic hepatitis	-	388	111	46
Total	-	16748	1341	113

Discussion: The obtained results indicate a significant change in the indicators of chemotherapy care in the day hospital of the AOC over the analyzed period. The 124.17% increase in hospitalizations of patients diagnosed with malignant neoplasms is primarily due to the growth in the registration of new cases of malignant neoplasms in Almaty, as well as the gradual transition to a hospital-substituting model of care. This trend corresponds to the global trend of increasing the availability of antitumor therapy in outpatient settings while maintaining the quality of medical care [7].

The analysis of the average inpatient stay showed a 38% increase, from 6.2 to 10 days. This was due to the expansion of the range of antitumor drugs used, including chemotargeted agents and immunotherapy, within the

framework of updated clinical protocols. Such growth also indicates an increase in the complexity and duration of treatment courses, requiring more time under the supervision of specialists.

The dynamics of the department's staff deserve special attention. The increase in the number of doctors, mid-level and junior medical personnel, as well as residents, by 34.6% (from 26 to 35 people) confirms the institutional strengthening of the department and its readiness to handle an increased patient flow. The expansion of the staff is especially relevant due to the need for prompt data entry into electronic systems and monitoring of patients' conditions.

The analysis of the nosological structure of cases, presented in Figure 1, also revealed a significant increase in

the number of hospitalizations in key areas of oncology, likely due to improved patient routing and earlier disease detection.

Notably, the number of AEs following chemotherapy has also increased along with the increase in the number of hospitalized patients. Thus, compared to 602 AEs registered in 2019, by 2024 their number increased to 18,202, i.e., by almost 2924%. The increase in the proportion of grade I AEs from 54.4% to 92% may indicate improved monitoring, early detection, and possibly the use of less aggressive treatment regimens to control the severity of reactions. At the same time, the occurrence of 113 grade IV AEs in 2024 requires special attention and further analysis to minimize risks and optimize treatment regimens. The noted changes reflect both quantitative and qualitative gains in the provision of specialized oncological care, confirming the effectiveness of the selected model of the Day Patient Chemotherapy Department in the context of increasing cancer incidence.

Conclusion: Consequently, the number of cases treated at the AOC Day Patient Chemotherapy Department has increased due to a growing number of patients being admitted for all localizations, the registration of new cancer cases, and the transition to inpatient replacement care at the Day Department. The AE indicators (fewer grade 2-3 AEs and more grade 1 AEs) suggest an improvement in the selection of patients for day treatment, as well as an improvement in the criteria for admission to a 24-hour hospital. However, despite the increase in staff numbers, the workload on medical personnel remains high. The staff of the day hospital chemotherapy department provides treatment to patients in 3 shifts. This situation dictates the need not only to increase the number of personnel and beds in the department and create electronic queues, but also to expand the possibilities of outpatient treatment of patients with AE, which are a burden for the staff of the Day Patient Chemotherapy Department.

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АНДАТПА

АЛМАТЫ ОНКОЛОГИЯЛЫҚ ОРТАЛЫҒЫНДАҒЫ ОНКОЛОГИЯЛЫҚ НАУҚАСТАРДЫ ЖҮЙЕЛІ ЕМДЕУДЕ СТАЦИОНАРЛЫҚ ҚӨМЕК ҚОРСЕТУДІ ТАЛДАУ

P.К. Өскембасова¹, Ж.Б. Қалпекова¹, Н.А. Избагамбетов², Р.О. Болатбекова², Ш.Т. Пазилов²

¹«Қ.И. Сәтбаев атындағы Қазақ ұлттық зерттеу техникалық университеті» КЕАҚ, Алматы, Қазақстан Республикасы;

²«Алматы онкологиялық диспансері» ШЖҚ МҚҚ, Алматы, Қазақстан Республикасы

Әзекмілігі: Статистикалық және есеп беру құжаттарына сәйкес, 2024 жылы Алматы онкологиялық диспансерінде (АОО) 23 732 онкологиялық ауру емделді, оның ішінде орталықтың күндізгі стационарның сәулелік терапия және химиотерапия бөлімшелері қызметтің 69,8 пайзын қөрсетті. АОО дамыту тұжырымдамасы пациенттердің медициналық қомектің стационарды алмасыратын тұрларіне қолжетімділігін көнегітуді қөздеді. Осы тұрғыда химиотерапия бойынша күндізгі стационар қызметтің талдау амбулаториялық жағдайда онкологиялық науқастарға қомек қорсетуді үйимдастыруды жетілдіруге ықпал ететін маңызды бағыт болып табылады.

Зерттеу мақсаты — Алматы онкологиялық орталығының күндізгі химиотерапиялық стационарның 2019-2024 жылдардағы жұмысын талдау.

Әдістері: Химиотерапия бойынша күндізгі стационардың жұмысын талдау құжаттаманың негізгі есеп және есеп беру нысандарын пайдалана отырып жүргізілді. Ауруханаға жатқызылған науқастар мен тіркелген жағымсыз құбылыстар санының қөрсеткіштері Daimymed деректер базасының электронды медициналық картасынан алынады. Зерттеу BR24993051 жобасы аясында жүргізілді.

Нәтижелері: Талданған кезеңде күндізгі стационарда қатерлі ісіктері бар науқастарды химиотерапия жатқызу 124,17%-ға артты. Зерттеу нәтижелері бастанқы жағдайларды тіркеудің үлғаюыны, сондай-ақ стационарлық алмасыратын қомекке көшу есебінен науқастарды госпитализациялаудың артқанын қөрсетті. Сонымен қатар, соғы 5 жылда (2019 жылдан 2024 жылға дейін) пациенттердің ауруханаға жатқызу санының өсуімен жағымсыз құбылыстарды тіркеу б02-ден 18 202 жағдайға дейін өсті.

Қорытынды: Құндызгі стационар жұмысын талдау бөлімнің кадрлық әлеуетін көнектіту, бөлімшедегі төсек-орын санын көбейту, электронды қезек құры, сондай-ақ құндызгі стационар қызметкерлеріне химиотерапия үшін ауыртпалақ түсіретін келенсіз жағдайлары бар науқастарға амбулаторлық көмек көрсету мүмкіндіктерін көнектіту қажеттілігін көрсетеді.

Түйінді сөздер: стационарды алмастыратын көмек, химиотерапия, онкологиялық орталық.

АННОТАЦИЯ

АНАЛИЗ ОКАЗАНИЯ СТАЦИОНАР-ЗАМЕЩАЮЩЕЙ ПОМОЩИ В СИСТЕМНОМ ЛЕЧЕНИИ ОНКОЛОГИЧЕСКИХ ПАЦИЕНТОВ В АЛМАТИНСКОМ ОНКОЛОГИЧЕСКОМ ЦЕНТРЕ

R.K. Өскенбаева¹, Ж.Б. Қалпекова¹, Н.А. Избагамбетов², Р.О. Болатбекова², Ш.Т. Пазилов²

¹НАО «Казахский национальный исследовательский технический университет имени К.И. Сатпаева», Алматы, Республика Казахстан;

²КГП на ПХВ «Алматинский онкологический центр», Алматы, Республика Казахстан

Актуальность: По данным статистики и отчетно-учетной формы документации в Алматинском онкологическом центре (АОЦ) за 2024 г. пролечено 23 732 случаев ЗНО, причём на долю дневных стационаров лучевой терапии и химиотерапии пришлось 69,8% всех случаев оказания помощи. В рамках концепции развития АОЦ предусмотрено расширение доступа пациентов к стационар-замещающим формам медицинской помощи. В этом контексте анализ деятельности дневного стационара химиотерапии является важным направлением, способствующим совершенствованию организации помощи онкологическим пациентам в амбулаторных условиях.

Цель исследования – проанализировать работу дневного стационара химиотерапии Алматинского онкологического центра за 2019-2024 гг.

Методы: Анализ работы дневного стационара химиотерапии был проведен с использованием основных учетно-отчетных форм документации. Показатели числа госпитализированных пациентов, зарегистрированных неожидательных явлений (НЯ) взяты из электронных историй болезней базы Datimed. Исследование проведено в рамках проекта ИРН BR24993051.

Результаты: За анализируемый период количество пациентов дневного стационара химиотерапии АОЦ увеличилось на 124,17% за счет роста регистрации первичных случаев, а также перехода на стационар-замещающую помощь. При этом, с увеличением числа госпитализации пациентов за последние 5 лет (с 2019 по 2024 гг.) отмечается рост регистрации НЯ с 602 до 18 202 случаев.

Заключение. Анализ работы дневного стационара актуализирует необходимость расширения кадрового потенциала отделения, увеличения койко-мест в отделении, создания электронных очередей. Также требуется расширить возможности амбулаторной помощи пациентам с НЯ, которые ложатся бременем на персонал дневного стационара химиотерапии.

Ключевые слова: стационар-замещающая помощь, химиотерапия, онкоцентр.

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Authors' details:

Uskenbaeva R.K. – professor, Doctor of Technical Sciences, Vice-Rector for Academic Affairs, Satbayev Kazakh National Technical University, Almaty, Kazakhstan, tel. +77012221293, email: rkuskenbayeva@satbayev.university, ORCID: 0009-0000-1911-5156;

Izbagambetov N.A. – PhD, Director, Almaty Oncology Center, Almaty, Kazakhstan, +77777168626, email: nurs@inbox.ru, ORCID: 0009-0009-4859-3929;

Kalpeyeva Zh.B. – PhD, Associate Professor, Deputy Director of the Institute of Automation and Information Technology, Satbayev Kazakh National Technical University, Almaty, Kazakhstan, tel. +77012221293, email: z.kalpeyeva@satbayev.university, ORCID: 0000-0002-4970-3095;

Bolatbekova R.O. (corresponding author) – PhD, Head of the Oncogynecology Department, Almaty Oncology Center, Almaty, Kazakhstan, tel. +77012221293, email: r.bolatbekova@gmail.com, ORCID: 0000-0002-4576-5432;

Pazylov Sh.T. – Head of the Day Patient Chemotherapy Department, Almaty Oncology Center, Almaty, Kazakhstan, tel. +77012270877, email: shuha_onco@mail.ru, ORCID: 0009-0007-1561-491X.

Correspondence address: Bolatbekova R.O., Almaty Oncology Center, Papanina 220a, Almaty, Kazakhstan.