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RATIONALE USE OF MEDICINES IN OUTPATIENT PRACTICE IN KAZAKHSTAN: ASSESSMENT OF WORLD HEALTH ORGANIZATION INDICATORS

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Abstract

Introduction: Rational use of medicines (RUM) is the cornerstone of safe, effective, and affordable outpatient care. We assessed how practices in Shymkent polyclinics align with WHO indicators.

Objective: To evaluate WHO indicators for prescribing and patient care in the outpatient setting and to identify variability requiring targeted improvements.

Materials and methods: A cross-sectional study based on WHO methodology (December 2024–April 2025) was conducted in 13 polyclinics. A total of 390 outpatient visits of patients were analyzed for patient-care indicators and 1300 prescriptions for prescribing indicators. Descriptive statistics, Welch's ANOVA, and permutation χ^2-tests were applied. Composite performance indices were constructed for benchmarking.

Results: The mean consultation duration was 13.5±6.2 minutes (range 3–35 across centers; $p<0.001$). Dispensing time averaged 205±139 seconds (45–960; $p<0.001$). On average, 94.4% of prescribed medicines were dispensed; 86.4% of patients correctly knew their dosages, both showing significant inter-center variation. An average of 1.8±0.9 medicines was prescribed per visit; 100% by INN and from the EML. Antibiotics were prescribed in 3.4% of visits (0–8% across centers; $p=0.01$). Injections were used in 24.5% of visits (low variability; $p=0.992$). Composite indices identified center 9 as best-performing in patient care and center 7 in prescribing; centers 2, 6, and 13 consistently lagged (e.g., in center 6 only 77% of medicines were dispensed, and dosage knowledge reached just 60%).

Conclusions: Outpatient care in Shymkent demonstrates strengths - low polypharmacy, universal INN prescribing, alignment with essential medicines, and relatively low antibiotic use. However, key challenges remain: wide variability in consultation and dispensing times, insufficient patient counseling, stock-outs of medicines in some centers, and persistently high injection prescribing. Priority measures: Standardization of consultation and dispensing processes, reduction of unnecessary injections through clinical protocols and provider training, strengthening of pharmaceutical counseling and patient education, and ensuring equitable medicine availability - especially in underperforming centers.

Keywords: *Rational use of medicines; World Health Organization indicators; Outpatient care; Kazakhstan polyclinics; Prescribing and dispensing.*

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Резюме

РАЦИОНАЛЬНОЕ ИСПОЛЬЗОВАНИЕ ЛЕКАРСТВЕННЫХ СРЕДСТВ В АМБУЛАТОРНОЙ ПРАКТИКЕ КАЗАХСТАНА: ОЦЕНКА ИНДИКАТОРОВ ВСЕМИРНОЙ ОРГАНИЗАЦИИ ЗДРАВООХРАНЕНИЯ

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Введение: Рациональное использование лекарственных средств (ЛС) - ключ к безопасной, эффективной и доступной амбулаторной помощи. Мы оценили, насколько практика в поликлиниках г. Шымкент соответствует индикаторам ВОЗ.

Цель: Оценить индикаторы ВОЗ по назначению и обслуживанию пациентов в амбулаторном звене и выявить вариабельность, требующую целевых улучшений.

Методы и методы: Поперечное исследование по методике ВОЗ (декабрь 2024 – апрель 2025) в 13 поликлиниках. Проанализированы 390 амбулаторных визитов пациентов для индикаторов обслуживания и 1300 рецептов для индикаторов назначения. Использованы описательная статистика, ANOVA Уэлча и перестановочные χ^2-тесты. Сформированы интегральные показатели (performance indices) для бенчмаркинга.

Результаты: Средняя длительность консультации - 13,5±6,2 мин (по центрам 3–35; p<0,001). Время отпуска ЛС - 205±139 сек (45–960; p<0,001). В среднем отпущено 94,4% назначенных ЛС; доля пациентов, знающих правильные дозы, — 86,4%; оба показателя существенно варьировали между центрами. В одном визите назначали 1,8±0,9 препарата; 100% назначений - по МНН и из перечня ЖНВЛП/EML. Антибиотики назначались в 3,4% визитов (0–8% по центрам; p=0,01). Инъекции - в 24,5% визитов (вариация мала; p=0,992). Интегральные индексы показали лучшую работу по обслуживанию в центре 9 и по назначению - в центре 7; центры 2, 6 и 13 последовательно отставали (например, в центре 6 отпущено лишь 77% ЛС, знание доз - 60%).

Выводы: Амбулаторная помощь в Шымкенте имеет сильные стороны - низкая полипрагмазия, 100% назначений по МНН и из перечня основных ЛС, относительно низкая частота назначения антибиотиков. Вместе с тем выявлены проблемные зоны: широкая вариабельность времени консультаций и отпуска, недостаточное информирование пациентов, дефициты ЛС в отдельных центрах и устойчиво высокий уровень назначений инъекций. Приоритетные меры: стандартизация длительности визитов и процессов отпуска, снижение необоснованных инъекций через клинические протоколы и обучение врачей, усиление фармацевтического консультирования и образовательной работы с пациентами, выравнивание доступности ЛС - прежде всего в центрах-аутсайдерах.

Ключевые слова: *Рациональное использование лекарственных средств; Индикаторы ВОЗ; Амбулаторная помощь; Поликлиники Казахстана; Назначение и отпуск лекарств.*

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Түйіндеме

ҚАЗАҚСТАНДАҒЫ АМБУЛАТОРЛЫҚ ТӘЖІРИБЕДЕ ДӘРІЛІК ЗАТТАРДЫ ҰТЫМДЫ ПАЙДАЛАНУ: ДҮНИЕЖҮЗІЛІК ДЕНСАУЛЫҚ САҚТАУ ҰЙЫМЫНЫҢ КӨРСЕТКІШТЕРІН БАҒАЛАУ

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Кіріспе: Дәрілік заттарды (ДЗ) ұтымды пайдалану - қауіпсіз, тиімді және қолжетімді амбулаторлық көмектің кілті. Біз Шымкент қаласының емханаларындағы тәжірибенің Дүниежүзілік денсаулық сақтау ұйымының (ДДСҰ) индикаторларына қаншалықты сәйкес келетінін бағаладық.

Мақсат: Амбулаторлық буында ДДСҰ индикаторларын (дәрі жазу және пациенттерді қамтамасыз ету) бағалау және мақсатты жетілдіруді талап ететін вариабельділікті анықтау.

Материалдар мен Әдістер: ДДСҰ әдістемесі бойынша көлденең зерттеу (2024 ж. желтоқсан - 2025 ж. сәуір) 13 емханада жүргізілді. Қызмет көрсету индикаторлары үшін 390 амбулаторлық қабылдау және дәрі жазу индикаторлары үшін 1300 рецепт талданды. Сипаттамалық статистика, Уэлч ANOVA және перестановкалы χ^2-тесттер қолданылды. Бенчмаркинг үшін интегралдық көрсеткіштер (performance indices) қалыптастырылды.

Нәтижелер: Консультацияның орташа ұзақтығы - 13,5±6,2 мин (орталықтар бойынша 3–35; p<0,001). ДЗ беру уақыты – 205±139 сек (45–960; p<0,001). Орта есеппен тағайындалған ДЗ-ның 94,4%-ы берілген; дұрыс дозаны білетін пациенттердің үлесі – 86,4%; екі көрсеткіш те орталықтар арасында айтарлықтай ерекшеленді. Бір қабылдауда орта есеппен 1,8±0,9 дәрі тағайындалған; 100% тағайындау Халықаралық патенттелмеген атаулар бойынша және Өмірлік маңызы бар дәрілер тізімінен жасалған. Антибиотиктер 3,4% қабылдауда тағайындалды (орталықтар бойынша 0–8%; p=0,01). Инъекциялар - 24,5% қабылдауда (вариация аз; p=0,992). Интегралдық индекстер қызмет көрсетуде 9-орталықтың, ал дәрі жазуда 7-орталықтың үздік жұмысын көрсетті; 2, 6 және 13-орталықтар жүйелі түрде артта қалды (мысалы, 6-орталықта ДЗ тек 77% берілген, дозаны білу деңгейі – 60%).

Қорытындылар: Шымкенттегі амбулаторлық көмек мықты жақтарға ие - төмен полипрагмазия, 100% МНН бойынша және негізгі ДЗ тізімінен тағайындаулар, антибиотиктердің салыстырмалы түрде төмен деңгейде тағайындалуы. Сонымен бірге, проблемалы аймақтар анықталды: консультация мен ДЗ беру уақытының едәуір вариабельділігі, пациенттерді жеткіліксіз ақпараттандыру, жекелеген орталықтардағы ДЗ тапшылығы және инъекциялардың тұрақты жоғары деңгейі. Басым шаралар: қабылдау ұзақтығы мен дәрі беру процесін стандарттау, негізсіз инъекцияларды клиникалық хаттамалар мен дәрігерлерді оқыту арқылы азайту, фармацевтикалық кеңес беру мен пациенттерге білім беруді күшейту, ДЗ қолжетімділігін теңестіру - ең алдымен артта қалып отырған орталықтарда.

Түйінді сөздер: *Дәрілік заттарды ұтымды пайдалану; Дүниежүзілік денсаулық сақтау ұйымының индикаторлары; Амбулаторлық көмек; Қазақстан емханалары; Дәрі жазу және беру.*

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Relevance

Rational use of medicines is considered one of the key elements of the healthcare system. It implies that the patient receives the necessary drugs strictly according to clinical indications, in dosages corresponding to the individual characteristics of the body, for an adequate period of time, and at an affordable cost [4,13,19]. Such use of medicines should be not only safe but also economically justified, which is directly related to the effectiveness of the entire healthcare system [20]. To achieve this goal, coordinated work is required at different levels of healthcare: starting from proper prescribing of drugs, their correct dispensing, and ending with responsible adherence to the treatment regimen by the patients themselves. Violations of these principles lead to irrational use of medicines, which today is of a global nature, especially in resource-limited countries.

According to the World Health Organization (WHO), up to half of all prescriptions worldwide are carried out improperly, and a significant proportion of patient's misuse prescribed medicines. In resource-limited settings, this leads to additional costs, increased drug resistance, and deterioration in the quality of healthcare. For Kazakhstan, as well as for other countries in the region, this issue is particularly relevant due to the need to improve the efficiency of the outpatient sector, which is the first and most common level of contact between the population and the healthcare system.

In the Republic of Kazakhstan, the issues of rational use of medicines are regulated normatively. In accordance with the order of the Ministry of Health dated November 3, 2020, No. ҚР ДСМ-179/2020, the assessment of rationality in the use of medicines is carried out both within medical organizations and during external inspections in the framework of accreditation [6]. This approach ensures control over the compliance of the care provided with established standards.

Despite the active implementation of international standards and national formularies in the country, empirical data on how much prescribing and dispensing of medicines correspond to WHO recommendations remain extremely limited. Existing studies are fragmented and rarely include a comprehensive assessment of both the clinical and organizational components of the process [22,21,3]. **The aim of this study** was to evaluate WHO indicators for prescribing and patient care in the outpatient setting and to identify variability requiring targeted improvements. In this regard, conducting a systematic analysis using the standardized WHO methodology in outpatient settings of Shymkent has become a necessary step to identify current problems, assess differences between medical organizations, and determine priority areas for optimizing the practice of prescribing and using medicines.

Materials and methods

In the conducted study, the main tool used was a standardized WHO questionnaire, which allows for a comprehensive assessment of factors influencing the rational use of medicines in outpatient practice. The study covered three key areas: analysis of the quality of drug prescribing, examination of the specifics of patient care, and assessment of the organizational conditions under which drug provision is carried out.

At the first stage, attention was focused on how exactly doctors prescribe drugs. The average number of medicines prescribed per visit, the frequency of prescribing drugs by international nonproprietary names, the frequency of prescribing antibiotics and injectable forms, as well as the compliance of prescriptions with the national drug formulary were evaluated. This block of indicators made it possible to understand how well prescriptions meet clinical recommendations and standards.

Next, the emphasis was placed on the interaction of the patient with the healthcare system. The duration of consultations, the time spent on dispensing medicines, the completeness of drug provision according to prescriptions, the awareness of patients about prescribed medicines, and the correctness of their labeling were studied. These parameters reflected the quality of communication between healthcare workers and patients, as well as the availability of information about treatment.

The third area was the assessment of the working conditions of medical organizations. Here, the availability of an up-to-date drug formulary, the provision of essential medicines, and their availability according to nosology's were taken into account.

The sample was formed in accordance with WHO methodological recommendations. To ensure the representativeness of the data, 13 polyclinics of Shymkent were selected from December to April 2024, in each of which 30 patients were randomly surveyed, making a total of 390 respondents. The study included patients over 18 years' old who were on dispensary observation and received free medicines at the outpatient level. Cases related to highly specialized medical care, such as immunization, psychiatry, or dentistry, were excluded.

Data collection covered all prescriptions issued to patients with chronic and acute diseases who met the inclusion criteria. This made it possible to obtain diverse material for analysis.

Thus, the research methodology was based on a comprehensive assessment of various aspects of the rational use of medicines and made it possible to obtain reliable data reflecting both the clinical and organizational side of the drug provision process at the outpatient level.

Statistical analysis. Statistical analysis and visualization of the obtained data were carried out using the statistical computing environment R 4.4.2 (R Foundation for Statistical Computing, Vienna, Austria).

Descriptive statistics are presented as absolute and relative frequencies for categorical variables, mean (± standard deviation), median (1st; 3rd quartiles), as well as minimum and maximum values for quantitative variables.

To assess the heterogeneity of the studied centers with respect to patient age, the Kruskal–Wallis test was used; to assess the heterogeneity of the studied centers with respect to gender composition and education level, a permutation χ^2 test was applied.

To assess the heterogeneity of the studied centers with respect to quantitative indicators, a one-way analysis of variance with Welch's correction was used; to assess heterogeneity with respect to binomial proportions, a permutation χ^2 test was applied.

Participant characteristics

The study included 390 patients for the calculation of patient care indicators and 1,300 prescriptions for the analysis of drug prescribing indicators (Table 1). The mean age of participants in both samples was similar - 59.4 ± 12.7 and 60.1 ± 14.1 years, respectively. However, inter-center differences were statistically significant ($p<0.001$ for the care sample; $p=0.031$ for the prescribing sample): in some centers the mean patient age was substantially lower (e.g., center 4 - 48.9 years) or higher (centers 2 and 5 – 65-68 years), reflecting the heterogeneity of the populations served. The age range was wide (from 13 to 92 years), indicating coverage of both young adults and elderly patients, including the oldest age groups.

Gender distribution in the overall sample was balanced: 58.5% women and 41.5% men, with no significant inter-center differences ($p=0.191$). However, in some polyclinics (e.g., 2, 3, and 5) women predominated (up to 70-73%), whereas in polyclinics 7 and 8 the proportion of men exceeded 50%. These differences may reflect both demographic features of the local population and the specific patterns of healthcare utilization.

Particular attention is drawn to the level of education. More than half of respondents had higher education (56.9%), meaning that the majority of study participants were highly educated. At the same time, differences between polyclinics were statistically significant ($p=0.004$): in polyclinics 6 and 7 the share of patients with higher education reached 73%, while in polyclinics 3 and 13 this figure did not exceed 40%. The presence of a small proportion of participants with only school education (2.3%) also deserves attention, since this group may be at greater risk of non-adherence to treatment and medication errors [18,15,11,9].

In terms of diagnostic profile, distribution was relatively uniform across the main groups of diagnoses (11-15% for each of categories 1-7). However, significant inter-center fluctuations were observed for rare conditions. For example, diagnosis 9 occurred in 2.6% of cases in the overall sample but ranged from isolated cases to 7% in some centers ($p=0.027$). Similarly, diagnoses 11 and 13, although rare (<1% overall), demonstrated significant differences between polyclinics ($p=0.049$ and $p<0.001$, respectively). This may indicate localized clusters of pathology or particularities of patient referral pathways in the studied institutions.

Patient-care indicators

Table 2 presents the results of the analysis of patient-care indicators in the studied polyclinics. Consultation time ranged from 3 to 35 minutes, with an average consultation time of 13.5 (±6.2) minutes, and statistically significant variability was observed between centers ($p<0.001$). Dispensing time ranged from 45 to 960 seconds, with an average dispensing time of 205.2 (±138.7) seconds, and statistically significant variability of this indicator was also observed between polyclinics ($p<0.001$). Center 10 stood out in particular, where the median time reached 480 seconds (8 minutes), which was more than four times higher than the figures of most other centers. In contrast, in centers 3, 4, and 7 the average time did not exceed 2 minutes. These differences may reflect both the specific organization of the pharmaceutical service and differences in the completeness of patient counseling.

The proportion of medicines dispensed ranged from 77% to 98%, with an average of 94.4% (±5.5), which corresponds to international standards of drug availability at the outpatient level. However, in center 6 this indicator was

Table 1. **Characteristics of patients.**

Characteristics	Overall	Center													p
		1	2	3	4	5	6	7	8	9	10	11	12	13	
Sample for patient-care indicators calculations															
n	390	30	30	30	30	30	30	30	30	30	30	30	30	30	
Age (years)															
Mean (±SD)	59.4 (±12.7)	57.3 (±8.2)	65.6 (±11)	55.2 (±8.1)	48.9 (±14.4)	65.7 (±11.4)	58 (±9.6)	62.9 (±10.3)	61.4 (±11.3)	61.1 (±13.2)	61.4 (±14.1)	53 (±12.7)	58.3 (±13.8)	62.8 (±14.7)	
Median (Q_1; Q_3)	59 (53; 64.5)	66.5 (59; 71)	56 (49; 61)	54 (36.5; 59)	68.5 (65; 71)	58 (52; 65)	63 (57.5; 69)	62 (53; 69)	64 (56.5; 68)	63 (57; 70)	56 (47; 59)	63 (49; 70)	65.5 (51; 73)	59 (53; 64.5)	**<0.001**
Min; max	18; 88	39; 70	47; 88	43; 72	18; 72	35; 81	35; 78	31; 87	37; 82	21; 82	18; 83	19; 80	30; 85	36; 85	
Gender															
female	228 (58.5%)	15 (50%)	21 (70%)	22 (73.3%)	17 (56.7%)	21 (70%)	21 (70%)	13 (43.3%)	14 (46.7%)	19 (63.3%)	14 (46.7%)	15 (50%)	19 (63.3%)	17 (56.7%)	0.191
male	162 (41.5%)	15 (50%)	9 (30%)	8 (26.7%)	13 (43.3%)	9 (30%)	9 (30%)	17 (56.7%)	16 (53.3%)	11 (36.7%)	16 (53.3%)	15 (50%)	11 (36.7%)	13 (43.3%)	
Education															
school	9 (2.3%)	0 (0%)	0 (0%)	4 (13.3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (6.7%)	0 (0%)	1 (3.3%)	1 (3.3%)	1 (3.3%)	
secondary specialized	159 (40.8%)	17 (56.7%)	11 (36.7%)	14 (46.7%)	12 (40%)	19 (63.3%)	8 (26.7%)	8 (26.7%)	7 (23.3%)	13 (43.3%)	15 (50%)	6 (20%)	12 (40%)	17 (56.7%)	**0.004**
higher	222 (56.9%)	13 (43.3%)	19 (63.3%)	12 (40%)	18 (60%)	11 (36.7%)	22 (73.3%)	22 (73.3%)	23 (76.7%)	15 (50%)	15 (50%)	23 (76.7%)	17 (56.7%)	12 (40%)	
Sample for prescribing indicators calculations															
n	1300	100	100	100	100	100	100	100	100	100	100	100	100	100	
Age (years)															
Mean (±SD)	60.1 (±14.1)	62.4 (±15.2)	61.1 (±15.8)	57.4 (±14.5)	61.7 (±15.4)	60.6 (±13.4)	57.1 (±13.3)	61.4 (±14.2)	60.9 (±12.5)	60.9 (±12.7)	59.9 (±12.8)	57.8 (±13.7)	61.3 (±12.8)	58.5 (±15.3)	
Median (Q_1; Q_3)	61 (53; 70)	65 (54; 72)	63.5 (55; 71)	59 (49; 68)	63 (53.8; 72)	61.5 (55; 69)	58 (49; 67.5)	64.5 (55; 71.2)	62 (52.5; 69)	61 (55; 68)	59.5 (54; 70)	58.5 (51; 67)	60 (53; 71)	62 (50; 70)	**0.031**
Min; max	13; 92	18; 88	13; 92	17; 91	20; 90	19; 89	18; 81	18; 83	29; 91	26; 84	23; 87	18; 83	23; 85	22; 86	
Diagnosis															
1	197 (15.2%)	23 (23%)	18 (18%)	16 (16%)	17 (17%)	14 (14%)	13 (13%)	16 (16%)	15 (15%)	12 (12%)	12 (12%)	14 (14%)	14 (14%)	13 (13%)	0.775
2	159 (12.2%)	9 (9%)	11 (11%)	13 (13%)	11 (11%)	14 (14%)	12 (12%)	11 (11%)	13 (13%)	15 (15%)	13 (13%)	13 (13%)	12 (12%)	12 (12%)	>0.999
3	153 (11.8%)	9 (9%)	12 (12%)	12 (12%)	11 (11%)	12 (12%)	13 (13%)	14 (14%)	12 (12%)	12 (12%)	11 (11%)	12 (12%)	13 (13%)	10 (10%)	>0.999
4	174 (13.4%)	16 (16%)	15 (15%)	14 (14%)	14 (14%)	13 (13%)	12 (12%)	13 (13%)	13 (13%)	14 (14%)	13 (13%)	13 (13%)	12 (12%)	12 (12%)	>0.999
5	144 (11.1%)	4 (4%)	9 (9%)	12 (12%)	11 (11%)	11 (11%)	11 (11%)	12 (12%)	13 (13%)	13 (13%)	11 (11%)	12 (12%)	12 (12%)	13 (13%)	0.874
6	154 (11.8%)	11 (11%)	12 (12%)	12 (12%)	13 (13%)	10 (10%)	12 (12%)	14 (14%)	12 (12%)	12 (12%)	12 (12%)	12 (12%)	12 (12%)	10 (10%)	>0.999
7	148 (11.4%)	7 (7%)	13 (13%)	12 (12%)	11 (11%)	14 (14%)	12 (12%)	12 (12%)	10 (10%)	11 (11%)	13 (13%)	9 (9%)	12 (12%)	12 (12%)	0.983
8	112 (8.6%)	3 (3%)	8 (8%)	6 (6%)	8 (8%)	7 (7%)	8 (8%)	7 (7%)	9 (9%)	11 (11%)	10 (10%)	12 (12%)	12 (12%)	11 (11%)	0.601
9	34 (2.6%)	1 (1%)	2 (2%)	2 (2%)	1 (1%)	5 (5%)	5 (5%)	1 (1%)	1 (1%)	0 (0%)	5 (5%)	3 (3%)	1 (1%)	7 (7%)	**0.027**
10	9 (0.7%)	3 (3%)	0 (0%)	1 (1%)	3 (3%)	0 (0%)	1 (1%)	0 (0%)	1 (1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0.064
11	5 (0.4%)	3 (3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (1%)	0 (0%)	1 (1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	**0.049**
12	2 (0.2%)	2 (2%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0.09
13	6 (0.5%)	6 (6%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	**<0.001**
14	1 (0.1%)	1 (1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	>0.999
15	1 (0.1%)	1 (1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	>0.999
16	1 (0.1%)	1 (1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	>0.999

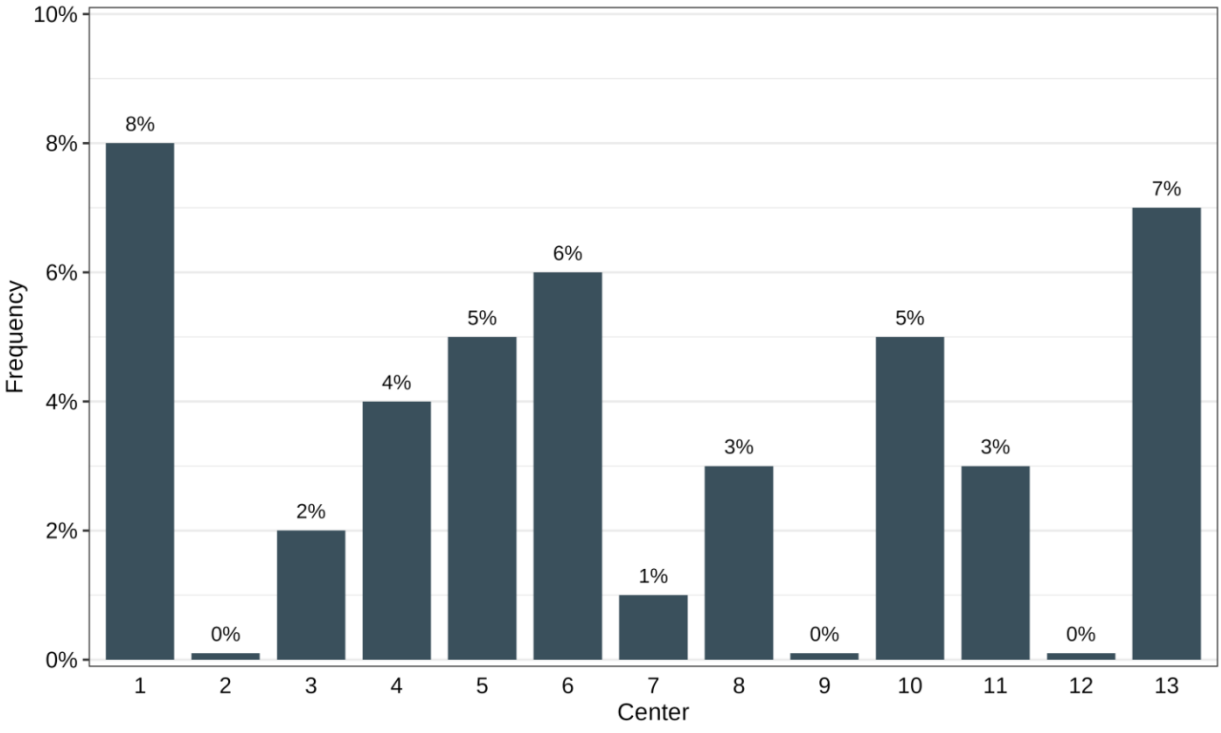
noticeably lower (77%), indicating problems with medicine supply in certain institutions (p<0.001). All dispensed medicines were adequately labeled. The proportion of patients informed about the correct dosage ranged from 60% to 93.3%, with an average of 86.4% (±10.1); statistically significant heterogeneity between the studied polyclinics was also established for this indicator (p=0.002).

Patient knowledge of the correct dosage of medicines averaged 86.4 ± 10.1%. In most centers this figure exceeded 90%, indicating a sufficient level of awareness. However, in center 6 it was minimal - only 60% of patients correctly reproduced the treatment regimen (p=0.002). This may indicate a lack of communication between healthcare workers and patients, as well as the need for additional educational interventions.

Table 2.

Indicators of patient care.

Center	Consultation time (minutes)	Dispensing time (seconds)	Dispensing time (seconds)	Percent medicines adequately labeled	Percent patients with knowledge of correct doses
1	7.1 (±2.6)	150.6 (±90.3)	94.1	100	93.3
2	7.6 (±2.2)	256.3 (±126.7)	98	100	90
3	15.1 (±4.5)	121.8 (±57.7)	92.2	100	93.3
4	19.1 (±5.9)	202 (±60)	95.9	100	90
5	20 (±2.6)	175 (±32.6)	97.4	100	86.7
6	7.8 (±2.2)	114.9 (±69.9)	77	100	60
7	13.9 (±4.5)	241.3 (±101.8)	96.7	100	93.3
8	17.4 (±5.1)	286 (±66.3)	97.3	100	93.3
9	14.5 (±2.5)	512 (±219.9)	93.8	100	70
10	16 (±5.6)	208.3 (±76.7)	96.5	100	90
11	15.8 (±5.7)	155 (±35.9)	96.9	100	83.3
12	15.7 (±4.9)	126.2 (±73)	94.6	100	90
13	5.7 (±1.7)	118.5 (±29.4)	96.7	100	90
Overall	13.5 (±6.2)	205.2 (±138.7)	94.4 (±5.5)	–	86.4 (±10.1)
p	<0.001	<0.001	<0.001	–	0.002



Picture 1. Percent encounters with an antibiotic prescribed.

Prescribing indicators

Table 3 presents the results of the analysis of prescribing indicators in the studied centers. On average, 1.8 (±0.9) medicines were prescribed per outpatient visit. However, statistically significant variability was observed between centers (p=0.002). In particular, in center 2 the average number of medicines was higher (2.2), whereas in centers 6 and 7 it was the lowest (1.6). Despite this, the median value in all centers remained equal to two medicines per visit, which corresponds to the optimal values recommended by WHO for the outpatient level.

Table 3.

Prescribing indicators

Center	Number of medicines prescribed per patient encounter	Percent medicines prescribed by generic name	Percent encounters with an antibiotic prescribed	Percent encounters with an injection prescribed	Percent medicines prescribed from essential medicines list
1	1.8 (±0.9)	100	8	18	100
2	2.2 (±1.1)	100	0	27	100
3	1.8 (±0.8)	100	2	26	100
4	1.8 (±0.8)	100	4	26	100
5	1.6 (±0.7)	100	5	24	100
6	1.6 (±0.8)	100	6	24	100
7	1.7 (±0.8)	100	1	22	100
8	1.7 (±0.9)	100	3	25	100
9	1.8 (±0.8)	100	0	26	100
10	1.8 (±0.8)	100	5	26	100
11	1.7 (±0.7)	100	3	26	100
12	1.7 (±0.7)	100	0	25	100
13	1.9 (±1)	100	7	23	100
Overall	1.8 (±0.9)	–	3.4 (±2.7)	24.5 (±2.4)	–
p	0.002	–	0.01	0.992	–

Table 4.

Performance indicators.

Performance indicators	Center												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Patient-Care Indicators													
Consultation time index	0.71	0.76	1.51	1.91	2	0.78	1.39	1.74	1.45	1.6	1.58	1.57	0.57
Dispensing time index	1.67	2.85	1.35	2.24	1.94	1.28	2.68	3.18	5.69	2.31	1.72	1.4	1.32
Dispensed drugs index	0.94	0.98	0.92	0.96	0.97	0.77	0.97	0.97	0.94	0.96	0.97	0.95	0.97
Labeled drugs index	1	1	1	1	1	1	1	1	1	1	1	1	1
Patients' knowledge index	0.93	0.9	0.93	0.9	0.87	0.6	0.93	0.93	0.7	0.9	0.83	0.9	0.9
IRPCDU	5.26	6.49	5.72	7.02	6.78	4.43	6.97	7.83	9.78	6.78	6.11	5.81	4.76
Rank	11	7	10	3	5	13	4	2	1	6	8	9	12
Prescribing Indicator													
Non-polypharmacy index	0.98	0.81	1.02	1	1.15	1.14	1.07	1.07	1.03	1.02	1.07	1.06	0.96
Generic name index	1	1	1	1	1	1	1	1	1	1	1	1	1
Rational antibiotic index	3.35	–	13.4	6.7	5.36	4.47	26.8	8.93	–	5.36	8.93	–	3.83
Injection safety index	1.34	0.89	0.93	0.93	1	1	1.1	0.96	0.93	0.93	0.93	0.96	1.05
Essential drugs list index	1	1	1	1	1	1	1	1	1	1	1	1	1
IRDP	7.67	3.71	17.34	10.63	9.51	8.61	30.96	12.96	3.96	9.31	12.93	4.02	7.84
Rank	10	13	2	5	6	8	1	3	12	7	4	11	9

The frequency of antibiotic prescribing was relatively low - 3.4% (±2.7%), which is below the thresholds reported in most developing countries. Inter-center differences were statistically significant (p=0.01): for example, in center 1 antibiotics were prescribed in 8% of visits, while in centers 2, 9, and 12 they were not prescribed at all Picture 1. This indicator reflects a relatively rational practice of prescribing antibacterial drugs, although the identified inter-center variations require further analysis of the underlying causes (e.g., differences in disease profiles or patient management strategies). In contrast, the frequency of prescribing injectable forms was high - 24.5% (±2.4%), and the differences between centers were not statistically significant (p=0.992). This level exceeds the optimal WHO reference values (<10%) and may reflect both the persistent practice of preferring parenteral forms and patient expectations. It should be noted that injections were prescribed in every fourth outpatient consultation, indicating the presence of a systemic trend that requires targeted interventions in the field of clinical guidelines and educational programs.

The analysis of summary indices showed considerable inter-center variability in the effectiveness of outpatient care delivery.

Patient-care quality indices

The consultation time index ranged from 0.57 (center 13) to 2.0 (center 5), reflecting differences in the availability and depth of physician - patient contact (see Table 4). The dispensing time index varied even more: the lowest values were observed in center 6 (1.28), whereas in center 9 it reached 5.69, indicating substantial differences in the organization of the pharmaceutical service. The index of medicines actually dispensed was consistently high across all centers (0.92–0.98), except for center 6 (0.77), pointing to problems with medicine supply in this facility. The patient knowledge index showed critical disparities: in center 6 it was only 0.6, while in most centers it exceeded 0.9. The overall integrated indicator of rational patient care (IRPCDU) was highest in center 9 (9.78) and lowest in center 6 (4.43), which made it possible to identify centers with the best and worst practices.

Drug prescribing quality indices

The non-polypharmacy index in all centers was close to the optimal values (0.96–1.15), indicating a relatively rational level of prescribed medicines (Table 4). The international nonproprietary name (INN) prescribing index was equal to 1 in all centers, reflecting a high degree of compliance with WHO standards. However, the most pronounced differences were identified in the rational antibiotic prescribing index: values ranged from no prescriptions (centers 2, 9, and 12) to 26.8 (center 7), indicating heterogeneity in antimicrobial therapy practices. The injection safety index was generally consistently high (0.89 - 1.34), and the essential drugs list (EDL) compliance index was maximal (1.0 in all centers). The overall integrated indicator of rational prescribing (IRDP) ranged from 3.71 (center 2) to 30.96 (center 7), showing a pronounced gap between leading and lagging centers.

Comprehensive assessment

The integration of care and prescribing data made it possible to identify two polar examples: center 9, which demonstrated the highest values for care (IRPCDU=9.78), and center 7, which showed the highest results for prescribing (IRDP=30.96). In contrast, centers 2, 6, and 13 were characterized by the lowest values in both blocks of indicators, requiring a targeted analysis of organizational and clinical factors.

Discussion

The results of the study demonstrated both the strengths of the outpatient medicine supply system in Shymkent and critical areas of risk. Among the positive findings is the high proportion of prescriptions written by international nonproprietary names (100%), which indicates compliance with the national medicines policy. Also noteworthy is the relatively low frequency of antibiotic prescribing, which favorably distinguishes Kazakhstan from a number of countries with high levels of antibiotic resistance.

At the same time, significant problems were identified. First, consultation duration and dispensing time varied several-fold between centers, indicating insufficient standardization of clinical processes. Second, the high frequency of prescribing injectable forms (a quarter of all visits) represents a persistent practice that contradicts international recommendations and may reflect the continued “cultural preference” for parenteral medicines. Third, in certain centers (especially in center 6) a critically low level of medicine availability (77%) and extremely low patient awareness of dosages (60%) were identified, creating risks of inappropriate medicine use and reduced treatment effectiveness [14, 5].

A strength of the study is the use of standardized WHO methodology and statistical methods, which allow for objective comparison across different centers. However, the limitations include the cross-sectional design (which makes it impossible to assess changes over time), as well as the potential influence of disease profiles on prescribing indicators [7–8].

Taken together, the data indicate the need for targeted organizational interventions -standardization of consultation duration, strengthening of pharmaceutical support, improving the availability of medicines, and the implementation of patient education programs. Particular attention should be given to the underperforming centers (2, 6, 13), where the indicators lag significantly behind the average values.

Our study, based on the standardized methodology of the WHO, revealed a multifaceted picture of the rational use of medicines in the outpatient sector of Shymkent.

First, the sociodemographic profile of participants demonstrated considerable heterogeneity between centers. Although the mean age of patients was about 60 years, some facilities were dominated by younger patients, while others by older adults. More than half of the participants had higher education, but the differences between centers indicate potential inequalities in the level of health literacy.

Second, the analysis of “patient-care indicators” showed significant differences in consultation duration and dispensing time. In some centers, consultations lasted more than 15–20 minutes, while in others they were limited to 5-7 minutes. Dispensing time also varied from less than 2 minutes to more than 8 minutes. Despite overall high medicine availability (>94%), one center reported a critical shortage (77%). A similar situation was observed with patient knowledge: in most facilities patients knew their

dosages, yet in one center this indicator was only 60%, creating risks of poor adherence. The study by Jimmy and colleagues showed that more than 60% of patients were unable to correctly recall instructions immediately after the visit, including dosage and frequency, which is very close to our scenario with "the center where knowledge was only 60%." In another study in Saudi Arabia, only 70% of knowledge indicators were satisfactory, which also confirms that in different facilities patient awareness may not reach even 70%, let alone 100% [12, 2].

Third, the "drug prescribing indicators" revealed both strengths and weaknesses. On average, 1.8 medicines (± 0.83) were prescribed per visit, which corresponds to WHO standards (1.6–1.8) and indicates a low level of polypharmacy, as shown in the study by GG Hailesilase et al. (2024) [10]. All prescriptions were made by international nonproprietary names, reflecting compliance with national medicines policy. At the same time, two serious problems remain: the frequency of antibiotic prescribing varied from 0 to 8% of visits, demonstrating heterogeneity of clinical practice, and injectable forms were prescribed in 24.5% of cases, which significantly exceeds the WHO reference values (<10%) and indicates a persistent practice of preferring parenteral medicines. Such variability reflects not only differences in clinical approaches between facilities but also the need to strengthen control over the rationality of prescribing. The high frequency of injection use, despite the availability of oral alternatives, may indicate persistent stereotypes among physicians and patients, which in the long term increases the risks of complications and unnecessary costs. These results underscore the relevance of implementing educational and regulatory measures aimed at reducing the excessive use of antibiotics and parenteral dosage forms [20, 6, 17].

Finally, the integrated "performance indicators" made it possible to identify both leading and underperforming centers. Thus, centers 7 and 9 demonstrated the best practices in prescribing and quality of care, respectively. At the same time, centers 2, 6, and 13 consistently showed low results across a number of parameters - from medicine availability to patient knowledge. This points to systemic differences within a single city healthcare network, likely related to organizational and managerial factors.

Among the strengths of the study is the use of validated WHO methodology, which ensures international comparability of data and provides a comprehensive analysis - from clinical practices to organizational conditions. The sample size and coverage of 13 polyclinics made it possible to identify both general patterns and local problems.

The limitations include the cross-sectional design, which does not allow for the assessment of changes over time, as well as the possible influence of the disease structure on prescribing indicators across different centers.

Conclusion

Our study was the first comprehensive assessment of the rational use of medicines in outpatient practice in Shymkent using WHO methodology. The results showed that, despite certain achievements - such as a low level of polypharmacy and 100% use of international nonproprietary names - serious challenges remain. Among them are: excessive prescribing of injectable forms, pronounced differences in consultation duration and dispensing time, insufficient patient awareness, and uneven medicine availability across centers.

To improve the situation, targeted interventions are needed, including: standardization of consultation duration and dispensing practices; reducing the frequency of injection prescribing through the implementation of clinical protocols and educational programs for physicians; strengthening pharmaceutical support and patient counseling, especially in underperforming centers; and ensuring equal availability of medicines across all healthcare facilities.

Thus, the rational use of medicines in outpatient practice is not only a matter of individual prescriptions but also an indicator of the effectiveness of the entire organizational model of healthcare.

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