

Physicians' Knowledge and Attitude about Generic Drugs in the Republic of Kazakhstan

Zandulla Nakipov¹, Dinara Kaliyeva¹, Assiya Turgambayeva^{1*} , Zakira Kerimbayeva¹, Zhalgaskali Arystanov², Tanagul Arystanova², Nellya Ivanchenko³, Nabil Joseph Awadalla⁴

Received: 18 Oct 2023

Published: 10 Jun 2024

Abstract

Background: One of the most effective measures to reduce the cost of medicines for both the healthcare system and patients is the use of generic drugs (GDs). The objective of this study was to identify the physicians' level of knowledge and attitude toward GDs.

Methods: A cross-sectional survey was conducted based on a specially designed validated questionnaire of 19 items. The survey was attended by doctors of various specialties working in polyclinics in six regions in the Republic of Kazakhstan. Construct validity was assessed through principal component factor analysis, whereas reliability was assessed using Cronbach's alpha coefficient. Group differences were assessed using Mann-Whitney and Kruskal-Wallis nonparametric tests when comparing two and more than two groups, respectively.

Results: The study involved 450 physicians. Only 260 (57.8%) believed that GDs are bioequivalent to the brand name drug (strongly agree and agree). About 202 (45%) of respondents doubt the effectiveness of GDs, and 144 (32%) assumed that they cause more side effects compared to similar branded drugs. Also, the majority of the respondents 320 (71.2%) felt that branded drugs should be held to higher safety standards than GDs. Approximately 338 (75%) of the physicians positively expressed that both physicians and pharmacists need standardized guidelines for the brand name substitution process. Further, 372 (82.7%) proposed that more information about the safety and efficacy of GD is needed. Also, 326 (72.4%), 314 (88.2%), and 85 (18.9%) of the respondents assumed that patients' socio-economic factors, trust in manufacturers/suppliers, and bonuses on products respectively influence the prescribing of medicines.

Conclusion: Although the study indicated that physicians in the Republic of Kazakhstan are acknowledging the use of GDs, concerns about the effectiveness and safety of GDs remain high. To enhance the use of GDs, physicians' targeted educational programs on GDs' bioequivalence, safety, and efficacy should be implemented.

Keywords: Attitude, Generic Drugs, Physicians, Knowledge

Conflicts of Interest: None declared

Funding: None

***This work has been published under CC BY-NC-SA 1.0 license.**

Copyright© Iran University of Medical Sciences

Cite this article as: Nakipov Zh, Kaliyeva D, Turgambayeva A, Kerimbayeva Z, Arystanov Zh, Arystanova T, Ivanchenko N, Joseph Awadalla N, Physicians' Knowledge and Attitude about Generic Drugs in the Republic of Kazakhstan. *Med J Islam Repub Iran.* 2024 (10 Jun);38:65. <https://doi.org/10.47176/mjiri.38.65>

Introduction

Access to quality essential medicines is part of the United Nations Sustainable Development Goal No. 3 and the key to achieving universal health coverage by 2030 (1).

One of the most effective measures to reduce the cost of

medicines for both healthcare providers and patients is the use of GDs. GDs have an additional social value that exceeds their savings potential by reducing prices. GDs expand access to pharmacotherapy, creating an incentive for

Corresponding author: Dr Assiya Turgambayeva, assiya739@gmail.com
tak1973@mail.ru

¹ Department of Public Health and Management, NJSC Astana Medical University, Astana, Kazakhstan

² Department of Pharmaceutical Disciplines, NJSC Astana Medical University, Astana, Kazakhstan

³ Department of Master's and Doctoral Studies, NJSC Asfendiyarov Kazakh National Medical University, Almaty, Kazakhstan

⁴ Department of Community Medicine, Mansoura Faculty of Medicine, Egypt.

↑What is "already known" in this topic:

To our knowledge, there have been no studies among local physicians in Kazakhstan assessing their knowledge, perceptions, attitudes, and practices regarding generic medicines and their substitution.

→What this article adds:

The results showed that physicians in Kazakhstan are well aware of the characteristics of generic drugs. However, the percentage of distrust remains high, which may negatively affect equal access to medicines for all patients.

innovation on the part of both manufacturing companies and companies producing GDs and, under certain circumstances, having a positive impact on treatment adherence. In many countries, the replacement of an equivalent drug with an original drug has been in use for many years (2). In the United States, the use of GDs approved by the FDA has saved consumers more than \$2.2 trillion over the past decade; 9 out of 10 prescriptions in the United States are written for GDs. In 2019, according to data provided by IQVIA, thanks to GDs, savings in the United States amounted to \$ 313 billion. The FDA says that increasing access to GDs could increase savings even more (3).

In the Republic of Kazakhstan, healthcare costs in 2019 accounted for about 2.8% of GDP (4). Thus, under conditions of limited financial resources, the allocation of a generic substitution policy as a cost-containment strategy will lead to savings in the healthcare budget. In total, more than 7,000 medicines are registered in the country, of which more than 70% are generics (5). Thus, although there is no official policy in the Republic of Kazakhstan to promote generics, generics are widely used in the public health sector as part of the provision of certain medicines to certain categories of citizens (6).

Many studies have been conducted around the world on the awareness of and attitudes toward generics among physicians, pharmacists, and patients.

According to various studies, low awareness of the characteristics of GDs among physicians and the reluctance of medical professionals to prescribe them has a significant negative impact on the rational use of more affordable GDs (2). The studies reported that the efficacy, safety, and quality of generics are questionable, and generic substitution and prescribing are controversial among healthcare providers (7).

To our knowledge, there have been no studies among local physicians in Kazakhstan assessing their knowledge, perceptions, attitudes, and practices regarding generic medicines and their substitution. In the present study, we would like to shed light on the rationality of using generic drugs and explore the criteria on which Kazakhstani physicians base the substitution of generics.

Since physicians' knowledge of GDs substitution and dispensing plays a crucial role in increasing the use of generics. This study aimed to identify the current level of physicians' knowledge and attitude about GDs. This study will help policymakers implement appropriate regulations regarding drug substitution policies to maximize the benefits for patients and Kazakhstani pharmaceutical practice.

Methods

A descriptive cross-sectional study was carried out in different regions of Kazakhstan between January to March 2023. The capital city, Astana, was chosen as the main urban center as one research area, along with five more cities, namely Karaganda, Kokshetau, Shymkent, and Semey. These cities are in the central, northern, southern, and eastern parts of the country. The city of Almaty is also included in the list as one of three cities of republican significance such as Astana and Shymkent.

The participants were recruited by a convenient sam-

pling method. In Astana, Karaganda, and Kokshetau, questionnaires were filled out personally by physicians in the presence of an interviewer. The goals and objectives of the study were explained before the start of the survey, and the informed consent of the participants was obtained. On the other hand, in Almaty, Semey, and Shymkent cities, invitations were sent via mass mailings of invitations by e-mail to physicians. Participants received an email with a full explanation of the study and its objectives and tasks. The email contained a link to a survey in which they were asked to consent to participate in the study before granting access. Those who do not give consent will not have access to the survey. All participants were informed that this study was intended for research purposes only, and their participation was voluntary and confidential.

The minimum required sample size was calculated using the sample size calculation formula for cross-sectional and survey studies with an anticipated prevalence of physicians' awareness of GDs of 50%, a confidence Interval of 95%, and an acceptable margin of error of 5% (8). As of January 1, 2021, there were 76,443 doctors in the Republic of Kazakhstan (9). The calculated sample size was approximately 383 respondents. The sample size was increased to 450 participants to account for possible non-responses. Hence there were no available precise data on the actual number of physicians in each of the selected cities, an equal proportionate distribution was assumed. The sample was divided into six, getting 75 subjects for each geographical region. We have received answers to all the questionnaires sent out. The eligibility criteria include physicians prescribing medications, older than 24 years of both sexes, who were willing to cooperate and expressed a desire to participate in the study. Physicians who do not prescribe medications are excluded from the sample.

A structured questionnaire for physicians' interviews was developed based on the same concept and approach as the questionnaire developed by a group of researchers led by Chua et al. 1 and comprised three sections: (1) doctors' demographics, (2) awareness about GDs, and (3) attitudes toward GDs (10, 11).

The first part of the questionnaire consisted of 6 questions for assessing demographic data, including sex, age categories (24–30, 31–40, 41–50, over 50 years), years in practice, position, responsibility position, and place of work. The second part included 6 questions to assess the doctor's awareness of GDs. The third part of the questionnaire examines the attitude of doctors to GDs and consists of 7 questions. The physicians were asked to indicate their responses for awareness and attitude statements on a 5-point Likert scale measurement ranging from strongly agree to strongly disagree.

The questionnaire was subjected to translation procedures according to the generally accepted rules of questionnaire translation. A pilot study was conducted on a group of physicians living in the city of Chymkent, Republic of Kazakhstan. Construct validity was assessed through principal component factor analysis, whereas reliability was assessed using Cronbach's alpha coefficient. Linguistic validation of the questionnaire for doctors included the translation of questionnaires from English into

Kazakh and Russian by two native speakers, independently of each other, following the generally accepted rules of questionnaire translation (12). The average KMO value for factor analysis of the Kazakh and Russian versions of the questionnaire was 0.79 and 0.72, respectively. Cronbach's alpha coefficients for the awareness and attitude sections' internal consistency were 0.68 and 0.71, respectively for the questionnaire in Kazakh, and 0.68 and 0.68, respectively for the questionnaire in Russian.

Statistical Analysis

Data entry, descriptive, and inferential statistics were performed using IBM SPSS Statistics version 23 software. Numbers and relative frequencies (%) were used as descriptive statistics for qualitative variables, while mean and standard deviation (SD) were used for quantitative variables. Group differences were assessed using Mann-Whitney and Kruskal-Wallis nonparametric tests when comparing two and more than two groups, respectively. A multiple linear regression model was used to explore the significant independent factors influencing the total physicians' knowledge and attitude (dependent variable for the model). The independent variables that entered the model were sex, age categories, years of experience, position, responsibility position and place of work. P-values less than or equal to 0.05 were considered statistically significant.

Results

Table 1 presents the demographic characteristics of the studied physicians. Most of the respondents 343 (76.2%) were female, between 31 and 40 years old, 151 (33.6%), and had a medical practice for more than 10 years 201 (44.7%). Approximately half of the respondents surveyed were general practitioners, 227 (50.4%). Only 77 (17%) of the respondents held a managerial position and most respondents worked in the public health sector 330 (73.3%).

Table 2 shows the responses of the doctors on various statements regarding their understanding of GDS. Although most respondents, 260 (57.8%) acknowledged that GDS are bioequivalent to the brand name drug (strongly agree and agree), a considerable percentage 119 (26.3%) responded neutrally and 71 (15.8%) disagreed. Most of the physicians assumed that GDS should have the same dosage form 280 (62.2%) and dosage 323 (71.7%) as the brand name drug. However, a considerable proportion were neutral or disagreed. Furthermore, 202 (44.9%) of respondents doubt the effectiveness of GDS, and 144 (32%) assumed that they cause more side effects compared to similar branded drugs. Also, the majority of the respondents 320 (71.2%) felt that branded drugs should be held to higher safety standards than GDS.

Regarding the physicians' attitude toward GDS, approximately 338 (75.1%) of the physicians who participated in the survey positively expressed that both physicians and pharmacists need standardized guidelines for the brand name substitution process, and most respondents 369 (82%) had a positive attitude toward the statement "Sufficient information about GDS should be provided to the

Table 1. Respondents' demographic characteristics (n=450)

Variable	No.	%
Gender		
Male	107	23.8
Female	343	76.2
Age (years)		
24-30	143	31.8
31-40	151	33.6
41-50	74	16.4
> 50	82	18.2
Years in practice		
1-5	154	34.2
6-10	95	21.1
>10	201	44.7
Position		
Non-specialist	227	50.4
Specialist	223	49.6
Responsibility position		
Senior	77	17.1
Non – senior	373	82.9
Place of work		
Public health sector	330	73.3
Private health sector	120	26.7

patient". About one-third of the respondents 163 (36.2%) believed that advertising influenced their prescribing patterns. Further, most of the respondents proposed that more information about the safety and efficacy of GDS is needed 372 (82.7%). Also, 326 (72.4%) and 314 (69.8%) of the respondents assumed that patients' socioeconomic factors and trust in manufacturers/suppliers, respectively, influence the prescribing of medicines. Moreover, a considerable proportion of respondents 85 (18.9%) assumed that bonuses on products offered by pharmaceutical companies would influence their choice of medicine.

Table 3 shows the factors associated with physicians' knowledge and attitude. Gender differences in approval of the statements "GDs should be in the same dosage form (e.g., tablets, capsules) and the same dose as the branded drug" were observed. Female physicians gave significantly stronger agreement ($P = 0.006$ and 0.034 , respectively) compared to male physicians. Also, senior physicians showed stronger agreement with the statement, "GDs should be in the same dosage form (e.g., tablets, capsules) as the branded ". On the other hand, no other demographic factors exhibited significant associations with physician awareness ($P > 0.05$).

Regarding physicians' attitudes, older physicians and physicians with longer duration of experience showed lower agreement to the statement "Pharmaceutical companies' product bonuses will influence my choice of medicines" ($P = 0.004$ and 0.001 , respectively). The increase in years of experience (> 5 years) was associated with more positive attitudes toward the statements "I think the patient should be given enough information about GDs to make sure they really understand about the medicines they take" and "I believe advertisement by the drug companies will influence my future prescribing pattern" ($P = 0.035$ and 0.026 , respectively). Also, physicians in the private sector showed a stronger agreement with the statement "I believe advertisement by the drug companies will influence my future prescribing pattern" compared to physicians in the public sector ($P = 0.021$).

Table 4 shows the results of multiple linear regression analysis for physicians' knowledge and attitude toward GDs. Gender was the only significant predictor of physicians' knowledge. Being a female physician was positively associated with a higher total knowledge score.

Table 2. Physicians’ knowledge and attitude toward GDs

No.	Items	Strongly agree n (%)	Agree n (%)	Neutral n (%)	Disagree n (%)	Strongly disagree n (%)
Physicians’ knowledge of GDs						
1.	A GDs is bioequivalent to a brand name medicine.	88 (19.6)	172 (38.2)	119 (26.4)	63 (14)	8 (1.8)
2.	A GDs must be in the same dosage form (e.g., tablet, capsule) as the brand name medicine.	90 (20)	190 (42.2)	116 (25.8)	53 (11.8)	1 (0.2)
3.	A GDs must contain the same dose as the brand name medicines.	119 (26.4)	204 (45.3)	69 (15.3)	54 (12)	4 (0.9)
4.	GDs are less effective compared to brand name medicines. (n)	53 (11.8)	149 (33.1)	119 (26.4)	122 (27.1)	7 (1.6)
5.	GDs produce more side effects compared to brand name medicines. (n)	37 (8.2)	107 (23.8)	142 (31.6)	159 (35.3)	5 (1.1)
6.	Brand name medicines are required to meet higher safety standards than GDs. (n)	124 (27.6)	196 (43.6)	74 (16.4)	48 (10.7)	8 (1.8)
Physicians’ attitude toward GDs						
1.	I believe we need a standard guideline for both Doctors and pharmacists on the brand substitution process.	137 (30.4)	201 (44.7)	87 (19.3)	22 (4.9)	3 (0.7)
2.	I think the patient should be given enough information about GDs to make sure they really understand about the medicines they take.	133 (29.6)	236 (52.4)	59 (13.1)	22 (4.9)	0
3.	I believe advertisements by the drug companies will influence my future prescribing pattern.	45 (10)	118 (26.2)	132 (29.3)	121 (26.9)	34 (7.6)
4.	I need more information on the issues pertaining to the safety and efficacy of GDs .	133 (29.6)	239 (53.1)	60 (13.3)	17 (3.8)	1 (0.2)
5.	Patient’s socio-economic factor will affect my choice of medicines.	83 (18.4)	243 (54)	71 (15.8)	48 (10.7)	5 (1.1)
6.	Credibility of the manufactures/suppliers is my concern when prescribing medicines.	89 (19.8)	225 (50)	83 (18.4)	48 (10.7)	5 (1.1)
7.	Pharmaceutical companies’ product bonuses will influence my choice of medicines.	17 (3.8)	68 (15.1)	83 (18.4)	179 (39.8)	103 (22.9)

(n)= negative items

Table 3. Factors influencing Physicians’ knowledge and attitudes toward GDs

			Physicians' knowledge on GDs								Physicians' attitude toward GDs							
Variable		Items	1	2	3	4	5	6	1	2	3	4	5	6	7			
Gender	Male	Mean	2.31	2.09	1.98	2.81	3.03	2.17	1.92	1.89	3.02	1.99	2.18	2.36	3.62			
		SD	1.06	0.93	0.91	1.11	1.00	0.98	0.86	0.70	1.27	0.87	0.98	1.08	1.15			
	Female	Mean	2.43	2.36	2.21	2.71	2.96	2.15	2.03	1.95	2.94	1.90	2.23	2.19	3.63			
		SD	0.99	0.92	0.99	1.01	0.98	1.01	0.87	0.81	1.06	0.74	0.88	0.87	1.09			
Age	P-value ^a		0.175	0.006	0.034	0.428	0.485	0.765	0.178	0.794	0.604	0.467	0.418	0.245	0.973			
	24-30	Mean	2.37	2.31	2.20	2.84	3.02	2.24	2.05	1.85	2.86	1.88	2.27	2.29	3.79			
		SD	0.97	0.90	0.97	1.00	0.95	1.00	0.85	0.77	1.09	0.80	0.91	0.93	1.12			
	31-40	Mean	2.42	2.26	2.07	2.65	2.97	2.11	2.01	2.00	3.02	1.91	2.13	2.21	3.70			
		SD	1.07	0.96	1.00	1.08	1.00	1.01	0.97	0.86	1.12	0.79	0.91	1.00	1.05			
	41-50	Mean	2.50	2.26	2.09	2.54	2.96	2.09	1.97	1.85	2.95	2.00	2.19	2.07	3.22			
		SD	0.98	0.95	0.97	0.97	0.94	0.98	0.86	0.72	1.17	0.74	0.85	0.78	1.19			
	Over 50	Mean	2.33	2.39	2.29	2.89	2.91	2.15	1.95	2.02	3.02	1.94	2.33	2.33	3.60			
		SD	1.01	0.91	0.96	1.03	1.07	1.02	0.72	0.74	1.08	0.73	0.93	0.90	1.03			
	P-value ^b		0.736	0.695	0.222	0.066	0.939	0.537	0.802	0.224	0.604	0.595	0.310	0.192	0.004			

Bold values indicate statistical significance, ^aMann-Whitney test, ^bKruskal-Wallis test.

Table 3. Continued

			Physicians' knowledge on GDs						Physicians' attitude toward GDs						
Variable	Items		1	2	3	4	5	6	1	2	3	4	5	6	7
Years in practice	1-5	Mean	2.38	2.38	2.18	2.76	3.07	2.22	2.03	1.86	2.84	1.85	2.18	2.21	3.73
		SD	1.02	0.95	0.99	1.04	0.94	1.04	0.89	0.81	1.14	0.79	0.92	0.93	1.14
	6-10	Mean	2.41	2.27	2.17	2.84	2.95	2.19	2.02	2.12	3.22	2.02	2.24	2.37	3.89
		SD	0.99	0.90	1.01	1.06	1.04	0.98	0.93	0.84	1.04	0.85	0.90	0.91	0.98
	>10	Mean	2.41	2.25	2.13	2.67	2.91	2.09	1.99	1.91	2.93	1.93	2.24	2.19	3.43
		SD	1.02	0.92	0.96	1.02	0.99	0.99	0.83	0.73	1.10	0.71	0.90	0.92	1.10
	P-value ^b		0.980	0.398	0.859	0.310	0.330	0.355	0.909	0.035	0.026	0.271	0.827	0.209	0.001
	Position	General Practitioner	Mean	2.42	2.33	2.15	2.78	3.01	2.15	2.00	1.96	2.92	1.89	2.15	2.22
		SD	1.02	0.93	0.97	1.03	0.97	0.98	0.89	0.80	1.08	0.78	0.85	0.95	1.10
Responsibility position	A doctor of another specialty	Mean	2.39	2.27	2.16	2.70	2.93	2.16	2.01	1.91	3.00	1.95	2.30	2.24	3.58
		SD	1.00	0.93	0.99	1.03	1.00	1.03	0.84	0.78	1.14	0.76	0.95	0.90	1.12
	P-value ^a		0.635	0.455	0.996	0.325	0.335	0.853	0.845	0.556	0.481	0.423	0.132	0.798	0.336
	Senior	Mean	2.30	2.08	1.95	2.56	2.95	2.27	1.88	1.83	2.78	1.87	2.21	2.32	3.82
		SD	1.06	0.87	0.84	1.06	1.01	1.08	0.92	0.86	1.13	0.78	0.92	0.99	1.06
	Non - senior	Mean	2.42	2.35	2.20	2.77	2.98	2.13	2.03	1.95	2.99	1.93	2.22	2.21	3.59
		SD	1.00	0.93	1.00	1.03	0.98	0.98	0.86	0.77	1.10	0.77	0.90	0.91	1.11
	P-value ^a		0.273	0.023	0.054	0.093	0.849	0.340	0.104	0.078	0.124	0.436	0.961	0.455	0.106
Place of work	State medical organization	Mean	2.40	2.33	2.19	2.77	3.01	2.18	2.03	1.96	2.88	1.93	2.24	2.18	3.63
		SD	1.03	0.95	1.02	1.03	0.95	1.00	0.84	0.79	1.07	0.76	0.88	0.87	1.11
	Private medical organization	Mean	2.40	2.23	2.05	2.64	2.88	2.09	1.94	1.87	3.17	1.90	2.17	2.37	3.63
		SD	0.96	0.86	0.86	1.04	1.07	1.01	0.94	0.77	1.20	0.81	0.99	1.06	1.10
	P-value ^a		0.933	0.331	0.278	0.230	0.285	0.369	0.148	0.272	0.021	0.622	0.269	0.170	0.951

Bold values indicate statistical significance, ^aMann-Whitney test, ^bKruskal-Wallis test.

Table 4. Multiple linear regression results for physicians' knowledge and attitude toward GDs

Independent variable	Variable coding	Unstandardized Coefficients		Standardized Coefficients	t	P-value
		B	Std. error	Beta		
Physicians' knowledge						
(Constant)		14.23	1.06		13.46	0.001
Gender	(Male=1, Female=2)	0.79	0.32	0.12	2.47	0.014
Age (years)	(24-30=1, 31-40=2, 41-50=3, 41-50=4)	0.08	0.21	0.03	0.37	0.713
Years in practice	(1-4=1, 6-10=2, > 10=3)	0.03	0.25	0.01	0.10	0.919
Position	(1= General practitioner, 2= A doctor of another specialty)	-0.05	0.29	-0.01	-0.16	0.872
Responsibility position	(1= senior, 2= non senior)	0.52	0.36	0.07	1.47	0.143
Place of work	(1=State medical organization, 2= Private medical organization)	0.22	0.31	0.03	0.70	0.482
Physicians' attitude						
(Constant)		16.24	1.45		11.17	0.001
Gender	(Male=1, Female=2)	-0.08	0.44	-0.01	-0.19	0.848
Age (years)	(24-30=1, 31-40=2, 41-50=3, 41-50=4)	0.05	0.28	0.01	0.17	0.861
Years in practice	(1-4=1, 6-10=2, > 10=3)	-0.15	0.35	-0.03	-0.43	0.666
Position	(1= General practitioner, 2= A doctor of another specialty)	0.24	0.39	0.03	0.60	0.547
Responsibility position	(1= senior, 2= non senior)	0.22	0.49	0.02	0.44	0.657
Place of work	(1=State medical organization, 2= Private medical organization)	0.21	0.42	0.02	0.49	0.623

Bold values indicate statistical significance

On the other side, none of the studied factors was significantly predicting the physicians' attitudes.

Discussion

In the present study, 260 (57.8%) of physicians agreed that GDs are similar in efficacy, quality, and safety compared to original brand-name drugs. These findings are higher than earlier studies by Chua et al. 43 (49.4%) (10, 11), Tsaprantzi et al. 74 (55.2%) (10), and Mahdi et al. 33 (26.6%) (13). Most of the physicians believe that GDs should have the same dosage form 28 (62.2%) and dosage 323 (71.7%) as the brand name drug, which is in agreement with the results of earlier studies by Chua et al. (57 (65.5%) and 71 (81.6%)), indicating good awareness of physicians about the characteristics of GDs (10).

The study found that 202 (44.9 %) of the respondents doubted the efficacy of GDs, and about 144 (32%) assumed that GDs cause more side effects, which is lower compared to the results of a study conducted among general practitioners in Malaysia where 32 (33.3%) of the respondents doubted the efficacy of GDs and only 9 (10.3%) believed that generics cause more side effects compared to branded drugs (10). Also, according to the results of our study, the majority of the respondents 320 (71.2%) believed that branded drugs should meet higher safety standards than GDs. This result indicates that although in general, most of the physicians were well informed about GDs, the percentage of distrust in their safety and efficacy remains high.

Regarding the physicians' attitude toward GDs, the majority of physicians 338 (75.1%) agreed that both physicians and pharmacists need standardized guidelines on the process of substitution of branded originals, and the majority of respondents also agreed that patients should be provided with adequate information about generic drugs to

ensure that they understand what medicines they are taking, which is also consistent with the results of earlier studies (10). Consequently, mass education can potentially enhance the use of GDs in healthcare. In Spain, an educational intervention on generic medicines has been shown to increase the acceptance of GDs among patients, and the number of prescriptions for generic medicines increased to 5.9% in groups receiving the educational intervention, compared to 2.8% in control groups (11). In Australia, the use of GDs is supported through prescribing guidelines and financial incentives provided by the Pharmaceutical Benefits Scheme (PBS). The generic prescribing policy in certain countries allows a pharmacist to dispense any brand of medicine if it bears the written generic name of the drug, but the pharmacist is not obliged to dispense the cheapest brand. The substitution policy GDs also allows a pharmacist, without consulting the physician, to dispense a different brand of drug, even if the physician has prescribed a particular brand of drug (14). With the introduction of co-payment mechanisms in Kazakhstan, providing patients with information on the safety, efficacy, and cost of GDs becomes particularly relevant. Indeed, if consumers refuse to substitute a generic, they will have to pay the price difference between the generic and the more expensive alternative. Therefore, there is a need to create a comprehensive awareness program to improve information about GDs. Adopting standardized guidelines for both physicians and pharmacists on how and when to perform brand substitution for their patients or introducing legislation mandating the use of GDs wherever possible will encourage the continued use of GDs and maintain the availability and affordability of medicines (15, 16).

In this study, physicians were asked to identify the factors influencing the prescribing pattern of medicines: 326 (72.4%) of the respondents agreed that socioeconomic

factors of the patient would influence the prescribing pattern; the majority of the respondents, 314 (69,8%) believed that trust in manufacturers/suppliers influenced the prescribing pattern. Similarly, in France, socioeconomic characteristics of the patients also played a key role in the willingness to prescribe medicines using generic names (17). General practitioners could more readily prescribe generics to patients of lower socioeconomic status because they believed that these patients faced budgetary constraints. In Jamaica, physicians were more obliged to prescribe generics to patients with chronic diseases due to their long-term financial burden (18).

The results of the present study indicated that about 282 (62.7%) of the respondents did not believe that bonuses on products offered by pharmaceutical companies would influence their choice of medication. A significant proportion of respondents in this survey recognized that the advertising and bonuses offered by pharmaceutical companies would influence their choice of medicines. This finding is also consistent with other studies that have shown that the prescribing behavior of physicians' prescribing behavior was influenced by their interactions with pharmaceutical companies (19). It is extremely important to educate general practitioners on how to act ethically and reasonably when receiving information from representatives of pharmaceutical companies (19).

Regarding physicians' attitudes, older physicians, and physicians with longer duration of experience showed lower agreement to the statement, "Pharmaceutical companies' product bonuses will influence my choice of medicines. Most likely, older doctors are more aware of generics. The increase in years of experience (> 5 years) was associated with more positive attitudes toward the statements "I think the patient should be given enough information about GDs to make sure they really understand about the medicines they take" and "I believe advertisement by the drug companies will influence my future prescribing pattern". Perhaps this age group is more susceptible to information, and this should be paid attention to when conducting information campaigns.

The results obtained should be used as one of the inputs to the drug policy debate, and systematic efforts and policies should be made to encourage the practice of prescribing and substitution of GDs.

Strengths

This is the first study in the Republic of Kazakhstan conducted to assess the level of awareness of physicians with their attitude to generic drugs. This survey can serve as a preliminary study and is useful for understanding physicians' knowledge and perceptions on issues related to the use of generic medicines in the Republic of Kazakhstan.

Limitations

The limitations of this study include the use of self-assessment and a limited number of questions to assess knowledge. In self-filling, the answers are likely to be biased. Also, the cross-sectional design does not allow us to determine the factors affecting the awareness of doctors

about generics. Further, the study did not assess the physicians' practices. Usually, the best way to evaluate a practice is achieved through on-site observation.

Conclusion

We studied the knowledge and attitudes of physicians towards generic drugs in six regions of the Republic of Kazakhstan. The results showed that physicians in Kazakhstan are well aware of the characteristics of generic drugs. However, the percentage of distrust remains high, which may negatively affect equal access to medicines for all patients. To increase the use of GDs in the Republic of Kazakhstan, it is necessary to ensure that physicians are properly informed about bioequivalence, quality, and safety issues in the GDs registration system.

Recommendations

Further research of this kind may be useful to clarify the role of information in shaping the attitude of doctors to the extensive introduction of generics and, thus, the reduction of unnecessary government expenditures and pocket expenses of consumers.

Authors' Contributions

Zandulla Nakipov: Research design

Dinara Kaliyeva: Designing the method and statistical analysis

Assiya Turgambayeva: Implementation of the plan

Zakira Kerimbayeva: Implementation of the plan

Zhalgaskali Arystanov: Data collection

Tanagul Arystanova: Data collection

Nabil Joseph Awadalla: Designing the method and statistical analysis

Nellya Ivanchenko: Implementation of the plan

Ethical Considerations

Decision LBC NJSC AMU No. 4. Session No. 10 date 11/25/2022.

Acknowledgment

All the authors thank all those who contributed to this study.

Conflict of Interests

The authors declare that they have no competing interests.

References

1. United Nations Economic and Social Council. Special edition: Progress towards the Sustainable Development Goal—Report of the Secretary-General. 2019. Available from: https://sustainabledevelopment.un.org/content/documents/22700E_2019_XXXX_Report_of_the_SG_on_the_progress_towards_the_SDGs_Special_Edition.pdf (Accessed 20 April 2023).
2. Kaliyeva DE, Turgambayeva AK, Kerimbayeva ZA, Zhumambaeva SM. Awareness of Generic Drugs Among Medical Practitioners and Patients: Literature Review. *Nauka i Zdravookhranenie [Science & Healthcare]*. 2021;5(23):199-207.
3. TAAM/Generic Drug & Biosimilars Access & Savings Report, New Jersey 2020. Available from: <https://accessiblemeds.org/2020-Access-Savings-Report> (Accessed 20 April 2023).
4. Health systems in action: Kazakhstan, 2022. Available from:

- <https://eurohealthobservatory.who.int/publications/i/health-systems-in-action-kazakhstan-2022> (Accessed 1 August 2023).
5. State register of medicines. Available from: <http://register.ndda.kz/> (Accessed 15 July 2023).
 6. Annual report of SK-Pharmacy LLP (2022). Available from: <https://sk-pharmacy.kz/rus/about/otchetnost> (Accessed 28 July 2023)
 7. Dietze J, Priluck A, High R, Havens S. Reasons for the Underutilization of Generic Drugs by US Ophthalmologists: A Survey. *Ophthalmol Ther*. 2020 Dec;9(4):955-970.
 8. Nguyen-Thi HY, Do-Tran MT, Ngoc TL, Nguyen-Ngoc TT, Le NDT. Assessment of Knowledge, Attitude, and Practice in Adverse Drug Reaction Reporting of Healthcare Professionals in Vietnam: A Cross-Sectional Study. *Hosp Pharm*. 2022 Jun;57(3):392-401.
 9. Overview of Kazakhstan's healthcare system: results of 2021. Available from: <https://primeminister.kz/ru/news/reviews/obzor-kazahstanskoy-sistemy-zdravoohraneniya-itogi-2021-goda-1933931> (Accessed 20 April 2023).
 10. Tsaprantzi AV, Kostagiolas P, Platis C, Aggelidis VP, Niakas D. The Impact of Information on Doctors' Attitudes Toward Generic Drugs. *Inquiry*. 2016 Mar 31; 53:0046958016637791.
 11. Qu J, Zuo W, Took RL, Schafermeyer KW, Lukas S, Wang S, et al. A nationwide survey exploring physicians' and pharmacists' knowledge, awareness and perceptions regarding generic medicines in China. *BMC Health Serv Res*. 2022 Aug 20;22(1):1069.
 12. Cai S, Huang X, Van C, Li W, Yan M, Lu Y, et al. General practitioners' attitudes towards and frequency of collaboration with pharmacists in China: a cross-sectional study. *BMC Health Serv Res*. 2023 Oct 27;23(1):1174.
 13. Mahdi LA, Kadhim DJ, Al-Jumaili AA. Knowledge, Perception and Attitude Regarding Generic Medicines among Iraqi Physicians. *Innov Pharm*. 2020;11(1):10.24926/iip.v11i1.2332.
 14. Kumar R, Hassali MA, Saleem F, Alrasheedy AA, Kaur N, Wong ZY, et al. Knowledge and perceptions of physicians from private medical centres towards generic medicines: a nationwide survey from Malaysia. *J Pharm Policy Pract*. 2015 Mar 16;8(1):11.
 15. Shraim NY, Al Taha TA, Qawasmeh RF, Jarrar HN, Shtaya MAN, Shayeb LA, et al. Knowledge, attitudes and practices of community pharmacists on generic medicines in Palestine: a cross-sectional study. *BMC Health Serv Res*. 2017 Dec 28;17(1):847.
 16. Li WJ, Xia MJ, Gong SW, Ding YF. Perceptions of Generic Drugs in the Pharmacists of Public Hospitals: A Cross-sectional Survey in Hubei Province of China. *Curr Med Sci*. 2021 Oct;41(5):987-995.
 17. Riner B, Bussy A, Hélène-Pelage J, Moueza N, Lamy S, Carrère P. "No generics, Doctor!" The perspective of general practitioners in two French regions. *BMC Health Serv Res*. 2017 Nov 9;17(1):707.
 18. Wynter-Adams DM, Thomas-Brown PG, Williams M, Bromfield L, Bunting-Clarke J. Assessment of rational use of medicines for chronic non-communicable diseases: A cross-sectional design in a public access clinic in Jamaica. *J Public Health Res*. 2022 Sep 30;11(3):22799036221126348.
 19. Mitchell AP, Trivedi NU, Gennarelli RL, Chimonas S, Tabatabai SM, Goldberg J, et al. Are Financial Payments From the Pharmaceutical Industry Associated With Physician Prescribing?: A Systematic Review. *Ann Intern Med*. 2021 Mar;174(3):353-361.