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THE IMPACT OF PARTICIPATION OF PATIENTS WITH CARDIOVASCULAR DISEASES IN THE GOVERNMENT PROGRAM “AFFORDABLE MEDICINES” ON THEIR ADHERENCE

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Introduction. High drug costs are one of the main barriers to achieving adherence, which jeopardizes the effectiveness of pharmacotherapy for chronic diseases. The general conclusion of a number of studies indicates a shortage of methods for increasing adherence. In order to reduce the financial burden on patients and increase the availability of medicines in Ukraine, the National Prescription Drug Cost Reimbursement Affordable Medicines Program (AMP) was launched. In 2018, the AMP received positive feedback on various criteria, but its impact on patient adherence hasn't been studied.

The aim of the study was to examine the impact of participation of patients with cardiovascular diseases (CVD) in the AMP on their adherence and to develop proposals for increasing adherence.

Results. Against the background of the overall low adherence of patients with CVD, the adherence of patients participating in the AMP was higher. The study found a weak, significant positive correlation ($r = 0.194$; $p \leq 0.05$) between patients' participation in the AMP and their level of adherence. Study results don't allow us to establish a clear dependence on the type of CVD and the adherence level of patients.

Conclusion. The results of the study demonstrated a significant positive effect of CVD patients' participation in the AMP on their adherence. The AMP may be an important tool for increasing adherence by expanding the range of drugs for the treatment of CVD through fixed combinations in a “single” pill that will meet all current guidelines for the provision of medical care for CVD, especially arterial hypertension.

Keywords: adherence, Affordable Medicines program, cardiovascular diseases, reimbursement.

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ВПЛИВ УЧАСТІ ПАЦІЄНТІВ ІЗ СЕРЦЕВО-СУДИННИМИ ЗАХВОРЮВАННЯМИ В УРЯДОВІЙ ПРОГРАМІ «ДОСТУПНІ ЛІКИ» НА ЇХ КОМПЛАЄНС

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Високі витрати на ліки є одним з бар'єрів для досягнення комплаєнсу, що ставить під загрозу ефективність фармакотерапії хронічних захворювань. З метою зменшення фінансового навантаження на пацієнтів та збільшення доступності ліків в Україні була започаткована урядова програма «Доступні ліки». Дослідження впливу участі пацієнтів із серцево-судинними захворюваннями (ССЗ) в програмі «Доступні ліки» на їх комплаєнс дасть можливість розробити шляхи підвищення комплаєнсу. На тлі загального низького комплаєнсу пацієнтів із ССЗ комплаєнс пацієнтів, які брали участь у програмі «Доступні ліки», був вірогідно вищим. Встановлено позитивний вірогідний зв'язок між участю в програмі та комплаєнсом пацієнтів. Вид ССЗ у пацієнтів не впливав на їх комплаєнс. Програма «Доступні ліки» може стати інструментом підвищення комплаєнсу пацієнтів після включення до неї фіксованих комбінації в «одній» таблетці та оптимізації відсотку доплати за ліки.

Ключові слова: комплаєнс, урядова програма «Доступні ліки», серцево-судинні захворювання, реімбурсація.

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Стаття поширюється на умовах ліцензії



Introduction

High drug costs are one of the main barriers to achieving adherence to long-term treatment in patients with chronic diseases, particularly cardiovascular diseases (CVD). In turn, low patient adherence jeopardizes the effectiveness of pharmacotherapy for chronic diseases and adversely affects the financial sustainability of healthcare systems.

Almost all countries have systems for reimbursing the cost of drugs to the population, the main task of which is to minimize the costs of citizens and the state budget for the purchase of medicines [1]. In 2017, the Ministry of Health of Ukraine launched the National Prescription Drug Cost Reimbursement Affordable Medicines Program (AMP). The main goal of the AMP is to reduce the financial burden on patients and increase the availability of medicines [2]. Patients with CVD (including coronary artery disease (CAD), arterial hypertension (AH), atherosclerosis), chronic lower respiratory tract diseases, endocrine diseases (including diabetes mellitus), neurological diseases, and patients requiring palliative care can participate in the program [2].

Adherence is defined as patients' tendency to adhere to clinical recommendations and treatment and it can be driven by many elements, including a patient's socioeconomic status, chronic conditions, patient-provider discordance, and healthcare access [3]. In recent years, various authors have been actively studying methods that increase patient adherence [4–6]. The general conclusion of all studies indicates a shortage of methods for increasing adherence and the need to develop a set of criteria for evaluating such methods.

The study of the adherence of patients with different chronic diseases has long attracted the attention of researchers. Alqarni A. M., Alrahbeni T., Qarni A. A. et al. [7] in their study showed that the level of adherence was suboptimal even when free medicines were available with a high level of health care access through government programmes. S. Panahi's research with colleagues suggested that a lower level of general adherence exists among elderly patients of the free clinic [8]. Among the factors influencing adherence in patients with AH, financial constraints were identified with 74.4 % of patients considering medications too expensive) [9]. Similar data were obtained in the study by Asgedom S. W. et al. [10]: adherence of patients with hypertension who received medication free of charge was 97.8 %, while adherence of those who paid for medication themselves was almost half as high – 43.9 %.

Some researchers have studied the impact of reimbursement methods on patient adherence. One such study [11] found low patient adherence across pharmacological classes, but no significant effect of reimbursement type (immediate or deferred) on adherence was found. One more study [12] showed that medication adherence improved with a reduction in the patient's share of the cost of medication, but found that patients who received their medication completely free of charge also had poorer adherence.

In 2018, the results of the study “AMP: Results and Recommendations for Progress in Achieving Universal Health Coverage” were published [13]. The AMP was evaluated based on the following criteria: effectiveness

(organizational aspects), access for patients, quality from the perspective of stakeholders, acceptance (by stakeholders, patients). The AMP received positive ratings for all indicators. The program received positive ratings on all indicators. However, no information was found in the available literature on the study of the impact of the AMP specifically on patient adherence. In our opinion, studying the relationship between patient participation in the AMP and the level of their adherence is relevant and will allow us to propose new approaches to increasing the adherence of patients with chronic diseases.

Our study was aimed to examine the impact of CVD patients' participation in National Prescription Drug Cost Reimbursement AMP on their adherence and to develop proposals for modernizing the Program to increase adherence among CVD patients.

Materials and Methods

The study was conducted in a pharmacy that has an agreement with the National Health Service of Ukraine to participate in the AMP during 6 months in 2024. 124 patients with CVD participated in the study. The criteria for including patients in the study were consent to participate in the study; age at least 18 years; diagnosis of AH or CAD; receiving antihypertensive and/or anti-ischemic pharmacotherapy. The exclusion criteria were: inability to communicate due to physical or mental problems; pregnant women.

Depending on whether CVD patients participated in the AMP, they were divided into two groups. Group I consisted of patients participating in the AMP. Group II included patients not taking advantage of this program. Adherence was assessed using the Morisky–Green scale: a version consisting of 4 questions was used (MMAS-4) [14].

Statistical data processing was performed using programs MS Excel for Windows XP, SPSS 10.0.5 and STATISTICA 5.0. Clinical, nonparametric descriptive and mathematical statistics were used to analyze the data. Descriptive statistics, such as means, were used to assess personal characteristics and adherence variables. Statistical characteristics of variables were presented using percentages, mean values (M), and their standard errors (m). To estimate the frequency of occurrence of the factor, the “Fisher's angular transformation” was used. The results of all statistical procedures were considered significant at $p < 0.05$. Correlation analysis was performed to confirm the proposed hypothesis. All methods applied during the study complied with requirements of the Declaration of Helsinki of the World Medical Association.

Research results and their discussion

The study included 124 patients with CVD aged 30 to 90 years, the mean age was 70.75 ± 10.3 . The gender distribution of the study participants was as follows: 44 males (35.49 %) and 80 females (64.51 %). 32.26 % of patients had higher education, 39.52 % had secondary specialized education, and 28.21 % had secondary education.

Among the surveyed patients, 50 % had AH, 8.06 % had CAD, and 41.94 % had comorbid pathology – a combination of AH and CAD (Fig. 1).

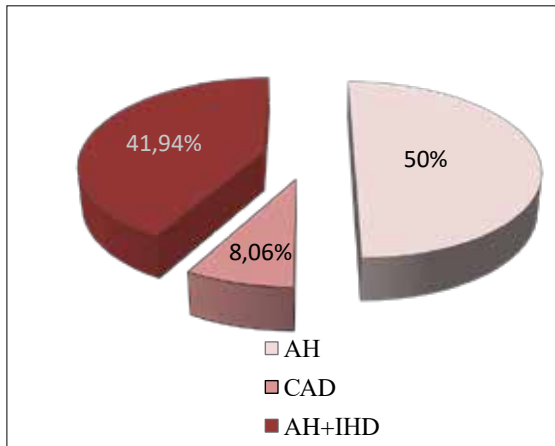


Fig. 1. Distribution of patients by type of CVD

All patients underwent blood pressure (BP) measurement. The target BP level of < 130/80 mm Hg was achieved in 33.33 % of all hypertensive patients (in 24 patients with AH and 14 patients with combination of AH and CAD).

All surveyed patients with various CVDs assessed their well-being using the criteria “good”, “satisfactory”, “partially satisfactory” and “unsatisfactory”. The vast majority of patients reported frequent and unsatisfactory well-being (Fig. 2).

Depending on their participation in the AMP, all patients were divided into two groups. Group I consisted of 74.2 % (92) patients participating in the AMP. Among them were 46 patients with AH, 10 (all) patients with CAD, and 36 patients with comorbid pathology – AH and CAD. The duration of participation in the AMP was up to 1 year in 15.21 % patients, from 1 to 2 years in 34.79 % patients, and more than 2 years in 50 % patients. Group II included 25.8 % (32) patients who did not participate in the AMP. This Group consisted of 15 patients with AH, 17 patients with comorbid pathology – AH and CAD.

According to the results of the survey using the MMAS-4 scale, we determined that the adherence of all patients with CVD was 48.39 %. This result is significantly lower than the generally accepted indicator described in the literature, 80 % [15]. Only one patient, which was about 1 %, was completely non-adherent.

According to the adherence level all patients were divided into 3 Subgroups. The Subgroup with a high adherence level (MMAS-4 = 4) consisted of 23.39 % patients, whose mean age was 71.53 ± 13.75 . The Subgroup with moderate adherence level (MMAS-4 = 2–3) consisted of 25 % patients, whose mean age was 60.08 ± 11.57 . The Subgroup with a low adherence level (MMAS-4 = 1) consisted of 50.81 % patients, whose mean age was 73.85 ± 13.18 . The gender distribution of patients in all subgroups is shown in the diagram (Fig. 3).

When conducting correlation analysis, the following results were obtained:

- Weak negative significant correlation ($r = -0.172$; $p < 0.05$) between patients’ age and adherence level;
- Weak positive significant correlation ($r = 0.28$; $p < 0.05$) between the level of education and the adherence level;
- Weak positive significant correlation ($r = 0.243$; $p < 0.05$) between the duration of the disease and the adherence level;
- Weak positive significant correlation ($r = 0.117$; $p < 0.05$) between the well-being of patients and their adherence;
- Weak negative significant correlation ($r = -0.136$; $p < 0.05$) between the level of BP and the adherence level of hypertensive patients.

Further analysis of adherence of patients with CVD depending on their participation in the AMP showed that adherence of patients in Group I was approximately 56 %, and patients in Group II – approximately 37 %. Among patients in Group II, one patient was completely non-adherent. The study also found a weak, significant

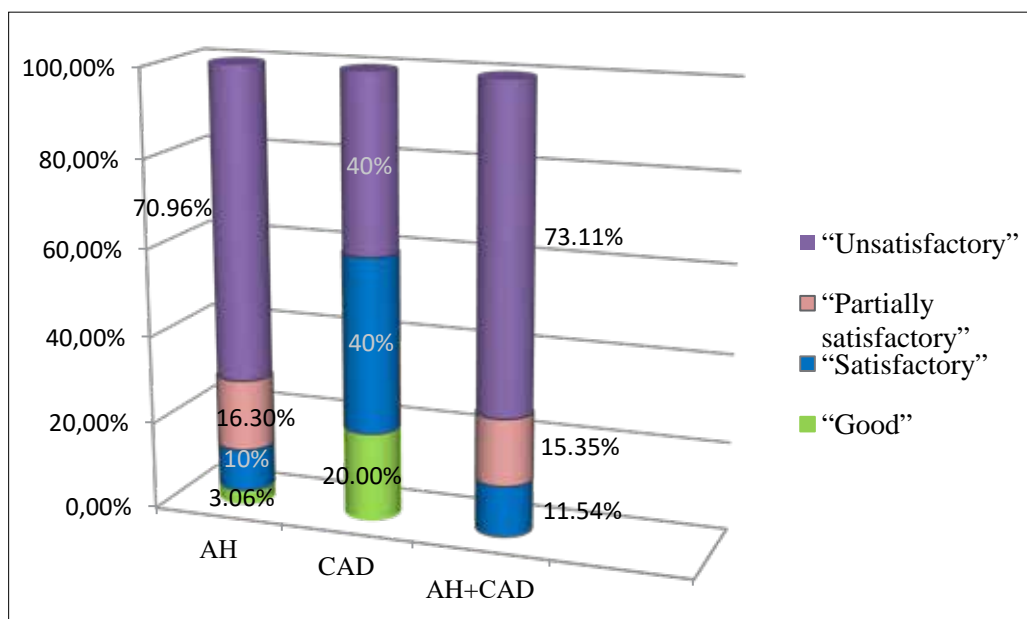


Fig. 2. Assessment of well-being in patients with various types of CVD

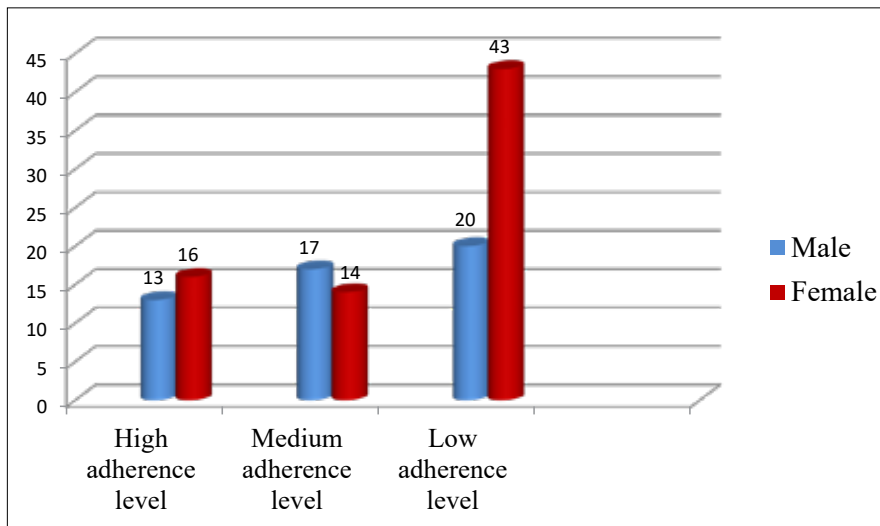


Fig. 3. Gender distribution of patients with different levels of adherence

positive correlation ($r = 0.194$; $p \leq 0.05$) between patients' participation in the AMP and their level of adherence. Thus, adherence of patients participating in the AMP was significantly ($p \leq 0.05$) higher than that of patients not participating in the AMP.

Among patients participating in the AMP, the numbers of patients with high and low adherence were significantly higher ($p \leq 0.01$) than in patients not participating in the AMP (Table 1).

Analysis of the adherence level of patients with different CVDs depending on participation in the AMP showed that in patients with AH, the moderate and low adherence levels significantly predominated among Group I patients. In patients Group I with comorbid pathology – AH and CAD the high and low adherence level significantly predominated (Table 2).

Table 1

Analysis of patient adherence levels depending on participation in the AMP

| Adherence level | Group I / Group II | |
|-----------------|--------------------|---------|
| | Φ_{em} | p |
| High | 2.543 | 0.0001* |
| Moderate | 1.378 | 0.0841 |
| Low | 3.979 | 0.0001* |

* $p \leq 0,01$ – significant difference in data in comparison groups.

Table 2

Analysis of the adherence level of patients with various CVDs depending on participation in the AMP

| Adherence level | Group I / Group II | | | |
|-----------------|--------------------|---------|-------------|---------|
| | AH | | AH+CAD | |
| | Φ_{em} | p | Φ_{em} | p |
| High | 0.568 | 0.2849 | 3.734 | 0.0001* |
| Moderate | 2.185 | 0.0144* | 0.568 | 0.2849 |
| Low | 1.941 | 0.0262* | 2.191 | 0.0142* |

* $p \leq 0,05$ – significant difference in data in comparison groups.

Conclusions

The results of the study demonstrated an overall low level of adherence in patients with CVD. Assessment of the gender and age distribution of adherence showed a predominance of high adherence levels in female and younger individuals. The decrease in adherence with increasing age of patients may be associated with cognitive impairments that can develop in elderly and senile patients. The established relationship between adherence and patient education indicates a more conscious attitude towards their health status and understanding of the need for CVD treatment in patients with higher education. A marked increase in patient adherence with increasing disease duration may characterize patients' understanding that CVDs, in particular with comorbid pathology – AH and CAD, have a chronic course and only constant long-term administration of recommended medications can ensure control of the course of the disease and improve the well-being of patients. This assumption is supported by the relationship between patients' well-being and their adherence. The study results also demonstrated a relationship between lower BP levels and higher patient adherence, confirming the important role of patients' adherence to all recommendations for achieving target BP levels.

Against the background of a rather low adherence of all patients with CVD, the adherence of patients who participated in the AMP was higher compared to both all study participants and the group of patients who didn't participate in the AMP. The established positive significant relationship between participation in the AMP and adherence of patients with CVD and the significantly higher number of patients with a high adherence level indicates a positive impact of the AMP on patient's adherence. It should be noted that the results of the study could have been influenced by the conditions in which it was conducted: the survey was conducted in a pharmacy, where patients came to purchase the necessary medications, which, in general, indicates their high awareness level regarding the need for treatment of CVD.

Among patients with comorbid pathology – AH and CAD who participated in the AMP, the number of patients

with a high adherence level was significantly higher than in hypertensive patients alone. At the same time, the number of patients with a low adherence level didn't depend on the type of CVD and was significantly higher in patients who participated in the AMP. Such results don't allow us to establish a clear dependence on the type of CVD and the adherence level of patients.

The significantly higher numbers of both high and low adherence levels among patients with CVD who participated in the AMP indicate the need to expand the program's impact on adherence among all patients with CVD. The AMP can be an important tool for improving adherence by expanding the range of drugs for the treatment of CVD through *fixed-dose* combinations in a single-dose forms that will meet all modern guidelines for providing medical care for CVD, especially AH. Optimizing the list of drugs for which the patients make a surcharge and the

percentage of co-payment can also contribute to improving adherence.

An expanded Register of Medicinal Products Subject to Reimbursement under the State Health Care Guarantee Program came into effect on January 1, 2025. The updated Register includes, in particular, *fixed-dose combination products* for the pharmacotherapy of CVD. Given that the present study was conducted in 2024, it would be promising to conduct further research aimed at assessing the changes in patient adherence as a result of the modernization of the AMP.

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Conflict of interests

The authors declare no conflict of interest.

BIBLIOGRAPHY

- Maidanyk RA. Dostup do likarskykh zasobiv v Ukraini: pryntsyyp spivrobitnytstva i yurydychna model farmatsevychnoho rynku [Access to medicines in Ukraine: the principle of cooperation and the legal model of the pharmaceutical market]. *Pravo i hromadianske suspilstvo*. 2014;1(6). (In Ukrainian). Available from: <http://lclaw.knu.ua/index.php/arkhiv-nomeriv/1-6-2014/item/156-dostup-do-likarskykh-zasobiv-v-ukraini-pryntsyyp-spivrobitnytstva-i-yurydychna-model-farmatsevychnoho-rynku-maidanyk-r-a>.
- Prohrama "Dostupni liky" [The program "Accessible Medicines"]. Natsionalna sluzhba zdorovia Ukrainy. 2021. (In Ukrainian). Available from: <https://edata.e-health.gov.ua/ogoloshennya-pro-ukladennya-dogovoriv/dostupni-liky>.
- Miller TA. Health literacy and adherence to medical treatment in chronic and acute illness: a meta-analysis. *Patient Educ Couns*. 2016;99(7):1079–1086. DOI: 10.1016/j.pec.2016.01.020.
- Kardas P, Bago M, Barnestein-Fonseca P, et al. Reimbursed medication adherence enhancing interventions in 12 european countries: Current state of the art and future challenges. *Front Pharmacol*. 2022;13:944829. DOI: 10.3389/fphar.2022.944829.
- Agh T, Hadziabdic MO, Garuoliene K, et al. POSC222 Eureka – Exploring Reimbursement Models for Medication Adherence Enhancing Interventions in European Countries: A Survey Protocol. *Value in Health*. 2022;25(1):S151. Available from: [https://www.valueinhealthjournal.com/article/S1098-3015\(21\)02532-8/fulltext](https://www.valueinhealthjournal.com/article/S1098-3015(21)02532-8/fulltext).
- Ágh T, Hiligsmann M, Borah B, et al. Systematic Review of Outcomes for Assessment of Medication Adherence Enhancing Interventions: An ISPOR Special Interest Group Report. *Value in Health*. 2024;27(2):133–142. Available from: [https://www.valueinhealthjournal.com/article/S1098-3015\(23\)06192-2/fulltext](https://www.valueinhealthjournal.com/article/S1098-3015(23)06192-2/fulltext).
- Alqarni AM, Alrahbeni T, Qarni AA, et al. Adherence to diabetes medication among diabetic patients in the Bisha governorate of Saudi Arabia – a cross-sectional survey. *Patient Prefer Adherence*. 2018;13:63–71. DOI: 10.2147/PPA.S176355.
- Panahi S, Rath N, Hurley J, Sundrud J, Lucero M, Kamimura A. Patient Adherence to Health Care Provider Recommendations and Medication among Free Clinic Patients. *J Patient Exp*. 2022;9. DOI: 10.1177/23743735221077523.
- Abbas S, Noor M, Masood AJ, et al. Analysis of medication adherence of chronic hypertensive patients in Pakistani community via open survey method. *Explor Med*. 2024;5:674–683. DOI: 10.37349/emed.2024.00248.
- Asgedom SW, Atey TM, Desse TA. Antihypertensive medication adherence and associated factors among adult hypertensive patients at Jimma University Specialized Hospital, southwest Ethiopia. *BMC Res Notes*. 2018;11(1):27. DOI: 10.1186/s13104-018-3139-6.
- Després F, Forget A, Kettani FZ, Blais L. PHP44 – Impact of Drug Reimbursement Modalities on Treatment Adherence in Patients Covered by Private Drug Insurance. *Value in Health*. 2014;17(3):A17. Available from: [https://www.valueinhealthjournal.com/article/S1098-3015\(14\)00159-4/fulltext](https://www.valueinhealthjournal.com/article/S1098-3015(14)00159-4/fulltext).
- Aziz H, Hatah E, Bakry MM, Islahudin F. How payment scheme affects patients' adherence to medications? A systematic review. *Patient Prefer Adherence*. 2016;10:837–850. DOI: 10.2147/PPA.S103057.
- Prohrama "Dostupni liky": Rezultaty i rekomendatsii dlia prohresu v dosiahnenni vsezahalnoho okhoplennia posluhamy okhorony zdorovia [The program "Accessible Medicines": Results and recommendations for progress in achieving universal coverage of health care services]. Kyiv; 2018. 41 p. (In Ukrainian). Available from: https://moz.gov.ua/uploads/1/8324-policy_dialogue_vf_ukr.pdf.
- Lukina Yu. V. The Moriscos-Green scale: The pros and cons of universal test, correction of mistakes. *Rational Pharmacotherapy in cardiology*. 2016;12(1):63–65. DOI: 10.20996/1819-6446-2016-12-1-63-65.
- Kim J, Combs K, Downs J, Tillman F. Medication Adherence: The Elephant in the Room. *US Pharm*. 2018;43(1):30–34. Available from: <https://www.uspharmacist.com/article/medication-adherence-the-elephant-in-the-room>.

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