DOI https://doi.org/10.32689/2663-0672-2026-1-11
UDC 615.1:614.2:616.12-008.331.1

PHARMACEUTICAL CARE FOR PATIENTS WITH HYPERTENSIVE DISEASE: INTEGRATION OF THE CLINICAL PHARMACIST INTO PRIMARY HEALTH CARE

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ФАРМАЦЕВТИЧНА ДОПОМОГА ПАЦІЄНТАМ ІЗ ГІПЕРТОНІЧНОЮ ХВОРОБОЮ: ІНТЕГРАЦІЯ КЛІНІЧНОГО ФАРМАЦЕВТА У ПЕРВИННУ МЕДИЧНУ ДОПОМОГУ

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Abstract

Background. *One of the most prevalent non communicable diseases worldwide, including in Ukraine, and a leading risk factor for the development of cardiovascular complications associated with high mortality and disability, is hypertensive disease (arterial hypertension), which remains a major global public health problem.* ***Aim.*** *The aim of this study was to substantiate the feasibility of involving a clinical pharmacist in the management of pharmacotherapy for hypertensive disease (arterial hypertension), to improve patient routing at the primary health care level, and to develop practical recommendations for the integration of pharmaceutical care.* ***Materials and Methods.*** *The study materials included information sources as well as the regulatory and legal framework of the medical and pharmaceutical sectors related to pharmaceutical care for patients with arterial hypertension. The study was carried out using a complex of general scientific and special methods.* ***Results.*** *The feasibility of integrating a clinical pharmacist into the pharmacotherapy management of hypertensive disease (arterial hypertension) was substantiated, and the key roles and functions of the clinical pharmacist at the primary health care level were systematized. Based on a questionnaire survey of patients with arterial hypertension, the impact of clinical and pharmaceutical counseling provided by a clinical pharmacist on patients' awareness of antihypertensive pharmacotherapy, treatment adherence, and blood pressure self-monitoring practices was assessed. The irregular use of self-monitoring data for pharmacotherapy adjustment indicates the need to strengthen the role of the clinical pharmacist in the long-term follow-up and support of patients with arterial hypertension. A comparative analysis of organizational models for managing patients with arterial hypertension at the primary health care level was conducted, and their advantages and limitations were identified. The most promising direction for the development of patient management at the primary health care level involves a combination of a team-based approach, telemedicine and telepharmacy tools, and patient self-management, which is consistent with current public health strategies and the principles of sustainable health care system development. A clinical pathway for patients with arterial hypertension at the primary health care level and practical recommendations for the integration of pharmaceutical care are proposed.* ***Conclusions****. The integration of a clinical pharmacist into primary health care for patients with hypertensive disease (arterial hypertension) may contribute to more efficient use of national health care system resources, promote a culture of patient responsibility for personal health, and strengthen the sustainability of the socioeconomic determinants of Ukraine's public health system.*

Key words: *pharmaceutical care, clinical pharmacist, hypertensive disease, arterial hypertension, primary health care, pharmacotherapy management, clinical and pharmaceutical counseling, interdisciplinary collaboration, patient routing.*

Анотація

Актуальність. *Однією з найпоширеніших неінфекційних патологій у світі, враховуючи Україну, та провідним фактором ризику розвитку серцево-судинних ускладнень, що зумовлюють високу смертність та інвалідність населення, є гіпертонічна хвороба (артеріальна гіпертензія), яка залишається провідною глобальною проблемою громадського здоров'я.* ***Мета роботи*** *– обґрунтувати доцільність участі клінічного фармацевта у менеджменті фармакотерапії гіпертонічної хвороби (артеріальної гіпертензії) та удосконаленні маршрутизації пацієнтів з даною патологією на рівні первинної медичної допомоги й запропонувати практичні рекомендації щодо інтеграції фармацевтичної допомоги.* ***Матеріали та методи дослідження.*** *У якості матеріалів слугували інформаційні ресурси та нормативно-правова база медико-фармацевтичного спрямування щодо фармацевтичної допомоги пацієнтам з артеріальною гіпертензією. Дослідження виконано з використанням комплексу загальнонаукових та спеціальних методів.* ***Результати та їх обговорення.*** *Обґрунтовано інтеграцію клінічного фармацевта у менеджмент фармакотерапії гіпертонічної хвороби (артеріальної гіпертензії), систематизовано його основні ролі та функції на рівні первинної медичної допомоги. На підставі анкетного опитування пацієнтів з артеріальною гіпертензією проведено оцінку впливу клініко-фармацевтичного консультування клінічного фармацевта на рівень поін-*

формованості пацієнтів з даною патологією щодо антигіпертензивної фармакотерапії, їхньої прихильності до лікування, практики самоконтролю артеріального тиску. Нерегулярне використання результатів самоконтролю для корекції фармакотерапії свідчить про потребу в посиленні ролі клінічного фармацевта у довготривалому супроводі пацієнтів з артеріальною гіпертензією. Проведено порівняльний аналіз організаційних моделей ведення пацієнтів з артеріальною гіпертензією на рівні первинної медичної допомоги, виявлені їх переваги та недоліки. Оптимальним напрямом розвитку ведення пацієнтів з артеріальною гіпертензією на рівні первинної медичної допомоги є поєднання командного підходу, телемедичних і телефармацевтичних інструментів та самоменеджменту хворих, що відповідає сучасним стратегіям громадського здоров'я та принципам сталого розвитку системи охорони здоров'я. Запропоновано клінічний маршрут пацієнта з артеріальною гіпертензією на рівні первинної медичної допомоги та практичні рекомендації щодо інтеграції фармацевтичної допомоги. ***Висновки.*** *Інтеграція клінічного фармацевта у первинну медичну допомогу пацієнтам із гіпертонічною хворобою (артеріальною гіпертензією) буде сприяти оптимізації використання ресурсів вітчизняної системи охорони здоров'я, формуванню культури відповідального ставлення пацієнтів до власного здоров'я та зміцненню стійкості соціально-економічної детермінанти системи громадського здоров'я України.*

Ключові слова: *фармацевтична допомога; клінічний фармацевт; гіпертонічна хвороба; артеріальна гіпертензія; первинна медична допомога; менеджмент фармакотерапії; клініко-фармацевтичне консультування; міждисциплінарна взаємодія; маршрутизація пацієнтів.*

1. Problem statement

A strategically significant objective of a country's social policy is to ensure the provision of high-quality medical and pharmaceutical care to all segments of the population. Under current conditions, one of the most prevalent non-communicable diseases worldwide, including in Ukraine, and a leading risk factor for the development of cardiovascular complications that result in high mortality and disability rates among the population, is hypertensive disease (arterial hypertension), which remains a major global public health problem.

According to the World Health Organization (WHO), arterial hypertension affects approximately one third of the adult population worldwide. In Ukraine, the probability of death between the ages of 30 and 70 years from non-communicable diseases, particularly cardiovascular diseases, ranks first among causes of premature mortality. Reducing premature mortality from non-communicable diseases, including cardiovascular diseases, by one third by 2030 is one of the strategic objectives of the Sustainable Development Goals (SDGs), specifically Goal 3.4, established by the WHO [17, 31].

A substantial increase in the prevalence of arterial hypertension among the working-age population of Ukraine leads not only to medical but also to significant socio-economic consequences, including reduced labor productivity and increased healthcare system expenditures. Despite the availability of national programs and the implementation of governmental initiatives, the level of blood pressure control among patients receiving primary health care remains insufficient. The complexity of the situation is driven by limited economic access to modern antihypertensive medicines, low patient adherence to treatment, complexity of therapeutic regimens, comorbidity, insufficient coordination and ineffective communication between healthcare professionals and patients, as well as the lack of a systematic approach to patient pathway management for individuals with arterial hypertension at the primary health care level. In this context, the integration of a clinical pharmacist into the primary health care team emerges as a promising approach to optimizing pharmaceutical care for patients with hypertensive disease. The involvement of a clinical pharmacist can enhance the effectiveness of arterial hypertension management through pharmacotherapy support, monitoring and control of drug–drug interactions, optimization of pharmacotherapy, implementation of patient education activities, and improvement of patient care pathways at the primary health care level [27]. However, within the national healthcare system, the role of clinical pharmacists remains insufficiently formalized and implemented.

2. Analysis of recent studies and publications

Issues related to optimizing the provision of pharmaceutical care to patients with cardiovascular diseases, including hypertensive disease, have recently received considerable attention and remain a constant focus of leading national pharmaceutical researchers. This is due to their contribution to improving the effectiveness of pharmacotherapy, reducing the risk of cardiovascular complications, increasing patient adherence to treatment, enhancing patients' quality of life, and ensuring the rational use of resources within the national healthcare system in the context of contemporary challenges. In particular, a group of authors [25] conducted a retrospective study on the consumption of medicines used for the treatment of arterial hypertension with the aim of further improving patient access to these medicines through the state reimbursement program. In study [9], the authors proposed approaches to

improving treatment compliance among patients with arterial hypertension. In publication [8], the process of pharmaceutical provision for patients with pulmonary hypertension was examined using the example of a specific city. In article [11], the authors analyzed the range of registered antihypertensive medicines available on the domestic pharmaceutical market and assessed their socio-economic affordability during pregnancy. Researchers in study [15] investigated pharmaceutical provision for patients with cardiovascular diseases within the framework of the governmental reimbursement program in order to evaluate its effectiveness in Ukraine. In study [2], the author substantiated the feasibility of expanding the pharmacist's functions within a comprehensive approach to the prevention of specific cardiovascular pathologies accompanied by comorbid conditions at the secondary and tertiary levels of healthcare delivery. The significant role of the clinical pharmacist in the management of arterial hypertension is supported by a growing body of scientific evidence obtained in various countries worldwide, highlighting the role and impact of pharmacists integrated into primary healthcare teams. In particular, publication [28] provides evidence of the importance of pharmaceutical care in the treatment of hypertension. The study demonstrates that pharmaceutical interventions have a positive effect on blood pressure control in patients with hypertension. Moreover, systematic reviews and meta-analyses indicate a statistically significant reduction in both systolic and diastolic blood pressure when clinical pharmacists are involved in patient care compared with standard treatment approaches, which is associated with a reduced risk of cardiovascular diseases in the long term. The authors in study [29] substantiated the involvement of pharmacists in the provision of care at the primary healthcare level, which ultimately leads to improved clinical outcomes in patients with hypertension. In randomized controlled trials, patients who received pharmaceutical care, including medication therapy review and individualized counseling, demonstrated significantly better blood pressure control, higher treatment adherence, and positive lifestyle-related behavioral changes compared with patients receiving standard care. The trend toward integrating pharmacists into multidisciplinary primary healthcare teams is becoming increasingly widespread in foreign countries, particularly in Canada, the United States of America, the United Kingdom, and Australia.

Interdisciplinary models of collaboration between pharmacists and primary healthcare physicians involve shared patient management, the inclusion of pharmacists in pharmacotherapy-related decision-making, adjustment of medication regimens, and monitoring of treatment effectiveness. Evidence indicates that pharmacists are able to identify potential medication-related problems, perform dose adjustments, and provide recommendations that are frequently accepted by physicians, thereby enhancing the effectiveness of patient care [26].

Thus, considering international experience, clinical pharmacists within primary healthcare occupy a distinct professional role that creates prerequisites for expanding the scope of their functions within an interprofessional collaboration model. This model is aimed at the effective utilization, integration, and transformation of expert knowledge in the field of medicines into a valuable and reliable resource for physicians.

Contemporary international and national clinical guidelines, as well as recent professional standards, recognize pharmacists as key members of multidisciplinary teams in the management of chronic diseases, including hypertensive disease. Their role is described not only in the context of medication provision but also in terms of pharmaceutical care, which encompasses the evaluation of pharmacotherapy effectiveness, individualized patient counseling, and support for self-monitoring of blood pressure.

Studies by domestic researchers have highlighted challenges in providing pharmaceutical care to patients with hypertensive disease, including insufficient informational support for pharmacists, the need to enhance practical competencies in accordance with evidence-based medicine recommendations, and the necessity to formalize the role of pharmacists within state pharmaceutical care programs [7].

Despite a substantial body of research on pharmaceutical care for patients with cardiovascular diseases, the rationale for integrating clinical pharmacists into primary healthcare for the provision of medical and pharmaceutical care to patients with hypertensive disease, following the specific directions outlined in our study, has either not been addressed or has been explored only fragmentarily. The above considerations determined the relevance of this study and defined its aim, objectives, structure, and the logical sequence of the research.

Objective of the study. Based on the identified challenges and analysis of current scientific evidence, the aim of this work was to substantiate the feasibility of involving a clinical pharmacist in the management of pharmacotherapy for hypertensive disease (arterial hypertension), to

improve patient routing at the primary health care level, and to develop practical recommendations for the integration of pharmaceutical care.

3. Materials and methods

To achieve the outlined objectives, the study utilized medical and pharmaceutical informational resources related to pharmaceutical care for patients with arterial hypertension, including PubMed, Cochrane, Embase, and others. The legal and regulatory framework included the evidence-based clinical guideline «Arterial Hypertension» – KN 2024-1581, the unified clinical protocol for primary and specialized medical care «Hypertensive disease (Arterial Hypertension)» – GS 2024-1581, Ministry of Health of Ukraine orders, and international clinical guidelines and recommendations (ESC/ESH, WHO, ISH). The study was conducted using a combination of general scientific and specialized methods, enabling a systematic evaluation of the role of the clinical pharmacist in providing pharmaceutical care to patients with hypertensive disease within the primary healthcare setting.

Presentation of the main research material. In the current context of healthcare system transformation and the increasing burden of non-communicable diseases, particularly hypertensive disease, the search for effective interdisciplinary models of care at the primary healthcare level has become especially relevant. Arterial hypertension, as a leading modifiable cardiovascular risk factor, is characterized by high prevalence, chronic progression, and significant dependence of clinical outcomes on the rationality and continuity of pharmacotherapy. Despite the availability of evidence-based clinical guidelines and a wide range of antihypertensive medications, the achievement of target blood pressure levels in real-world clinical practice remains insufficient. This is largely due to issues such as poor medication adherence, polypharmacy, drug–drug interactions, and the limited time available to primary care physicians for in-depth pharmacotherapy management. In this context, the integration of a clinical pharmacist as a specialist in medication therapy management into the primary healthcare team is considered a scientifically justified and practically feasible tool to improve the quality and safety of treatment for patients with hypertensive disease. Therefore, the present study focused on a systematic analysis of the potential role of clinical pharmacists in the management of pharmacotherapy for hypertensive disease (arterial hypertension), justification of their functional role within a multidisciplinary primary care team, and identification of strategies to optimize pharmaceutical care, taking into account patient needs and current evidence-based medicine standards.

We have systematized the main roles and functions of clinical pharmacists in the management of hypertensive disease (arterial hypertension) at the primary healthcare level (Table 1), substantiated the rationale for involving this specialist, and assessed their impact on patient treatment outcomes.

Contemporary approaches to the management of patients with hypertensive disease are based on the concept of interdisciplinary collaboration, which предусматриє the involvement of healthcare professionals from various disciplines in the provision of care at the primary healthcare level [34,35]. In this context, the clinical pharmacist is regarded as an important member of the primary healthcare team, capable of providing pharmaceutical support for medication therapy aimed at improving its effectiveness, safety, and accessibility for patients with arterial hypertension. An analysis of current scientific evidence indicates that the integration of clinical pharmacists into the primary healthcare system aligns with the present challenges of managing chronic non-communicable diseases and the principles of patient-centered care [23,24].

One of the key areas of activity of the clinical pharmacist in the management of hypertensive disease is the assessment of the rationality of prescribed pharmacotherapy. The involvement of pharmacists in the analysis of treatment regimens enables the identification of potential drug–drug interactions, irrational combinations of antihypertensive medicines, duplication of therapy, and risks of adverse drug reactions. This is particularly relevant for patients with comorbid conditions who receive complex, multi-component medication regimens. In this regard, the clinical pharmacist performs the role of a medication safety expert, contributing to the optimization of pharmacotherapy and the reduction of medication-related risks [10,18,33].

An essential component of the integrated pharmaceutical care model is the participation of the clinical pharmacist in the individualization of treatment for patients with hypertensive disease. Taking into account patient age, comorbidities, cardiovascular risk, and lifestyle characteristics, the pharmacist can provide evidence-based recommendations regarding the selection of medicines, dose adjustments, and dosing regimens. Such a personalized approach enhances the effectiveness of antihypertensive therapy and facilitates the achievement of target blood pressure levels, as confirmed by the results of clinical studies and systematic reviews [20,21].

Table 1

Roles and functions of the clinical pharmacist in the management of hypertensive disease (arterial hypertension) at the primary healthcare level

Role of the Clinical Pharmacist in Disease Management	Key Functions of the Clinical Pharmacist	Expected Impact on Treatment Outcomes
Pharmacotherapy Assessment	Analysis of prescribed antihypertensive medications; identification of potential drug–drug interactions, therapy duplication, irrational combinations; evaluation of adherence to clinical guidelines	Increased safety of pharmacotherapy; reduced incidence of adverse drug reactions; optimization of treatment regimens
Pharmacotherapy Individualization	Consideration of age, comorbidities, concomitant diseases, and risk of complications; involvement in dose adjustments and selection of medications	Enhanced treatment effectiveness; achievement of target blood pressure levels
Clinical-Pharmaceutical Patient Counseling	Providing information on medication regimen, duration of therapy, possible side effects; explaining the importance of regular treatment	Improved patient adherence; reduced self-discontinuation of medications
Monitoring Treatment Adherence	Identifying causes of poor adherence (adverse effects, complex regimens, financial constraints); providing recommendations to simplify therapy	Enhanced compliance; stabilization of blood pressure
Educational Activities and Prevention	Informing patients about non-pharmacological measures (lifestyle modification, diet, physical activity); training in self-monitoring of blood pressure	Reduced cardiovascular risk; increased patient responsibility for their own health
Interdisciplinary Collaboration	Cooperation with primary care physicians; providing recommendations for therapy adjustments; involvement in shared patient management	Improved quality of medical care; harmonization of therapeutic decisions
Pharmacovigilance and Safety	Detection and documentation of adverse reactions to antihypertensive medications; participation in pharmacovigilance; informing the professional medical community	Reduced medication-related risks; improved drug safety

A particularly important aspect of the professional activity of the clinical pharmacist is clinical-pharmaceutical counseling and patient education. To assess the impact of clinical-pharmaceutical counseling on the level of patient awareness regarding antihypertensive pharmacotherapy, treatment adherence, and blood pressure self-monitoring practices, as well as to determine the role of the clinical pharmacist in improving blood pressure control and optimizing pharmaceutical care at the primary healthcare level, a patient questionnaire survey was conducted among individuals with hypertension at selected healthcare facilities in the city of Kharkiv. The majority of respondents reported having received clinical-pharmaceutical counseling; however, only 37% indicated that explanations regarding the mechanism of action of antihypertensive medicines were provided in a complete and comprehensible manner (Figure 1).

The results of the content analysis [19,22,30,36] and the questionnaire survey confirmed that low patient adherence to antihypertensive pharmacotherapy remains one of the leading causes of inadequate blood pressure control. Despite the fact that the majority of patients reported having contact with a clinical pharmacist (Figure 1), only 37% perceived the counseling as comprehensive and understandable. A substantial proportion of respondents indicated the absence or insufficiency of discussion regarding adverse drug reactions and drug–drug interactions, which is a critical factor in the formation of treatment adherence. Systematic counseling on the rules of medication use, duration of treatment, possible adverse effects, and the necessity of continuous pharmacotherapy contributes to the development of a conscious and responsible patient attitude toward treatment. In addition, the clinical pharmacist plays an important role in the implementation of non-pharmacological interventions, including lifestyle modification, weight management, healthy dietary practices, and self-monitoring of blood pressure. It was found that an additional limiting factor in the effectiveness of hypertensive disease treatment is insufficiently developed skills in blood pressure self-monitoring. Regular home blood pressure monitoring is performed by less than half of the surveyed patients (42%),

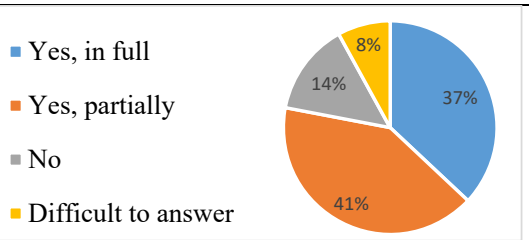
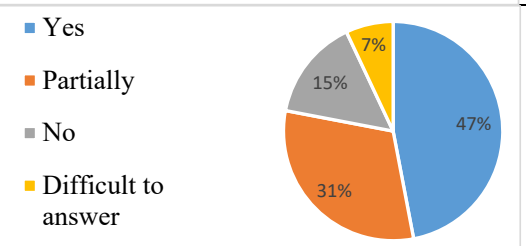
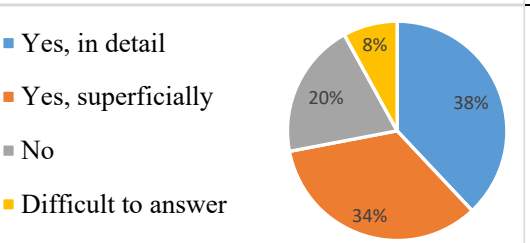
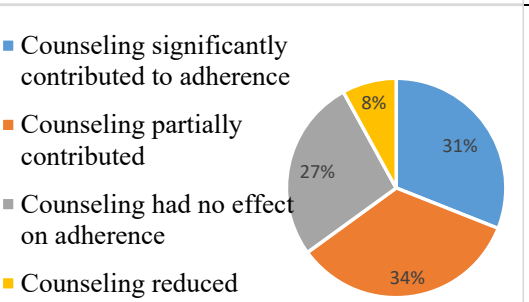
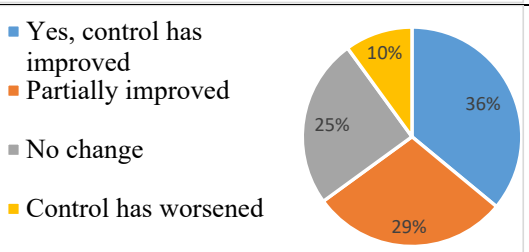
Questions for patients with arterial hypertension	Survey results
Did you receive a clear explanation from a pharmacist/clinical pharmacist regarding the mechanism of action and purpose of the antihypertensive medicines you are taking?	
Did the pharmacist/clinical pharmacist provide recommendations on the correct regimen for taking antihypertensive medicines (timing, dosing frequency, duration of treatment)?	
Were possible adverse drug reactions and drug–drug interactions of antihypertensive medicines discussed during clinical-pharmaceutical counseling?	
To what extent did the consultation with a pharmacist/clinical pharmacist contribute to your adherence to antihypertensive pharmacotherapy (regular medication intake)?	
Did the recommendations provided by the pharmacist/clinical pharmacist help you achieve better control of your blood pressure levels?	

Fig. 1. Results of the questionnaire survey of patients with arterial hypertension

while only 28% keep a self-monitoring diary. The irregular use of self-monitoring results for pharmacotherapy adjustment indicates the need to strengthen the role of the clinical pharmacist in the long-term management of patients with arterial hypertension. Involving pharmacists in educational and counseling activities can increase patient awareness of the disease, non-pharmacological preventive measures, and the importance of regular blood pressure monitoring. Collectively, these measures create prerequisites for improving long-term clinical outcomes, reducing the incidence of complications, and enhancing the quality of life of patients with hypertensive disease.

One of the key professional functions of the clinical pharmacist in the management of hypertensive disease is the systematic monitoring of patient adherence to prescribed antihypertensive therapy. This process is

considered multidimensional and includes the assessment of medication-taking regularity, adherence to dosing regimens, duration of treatment, and correct use of combination pharmacotherapy. By using validated adherence assessment tools (including questionnaires, analysis of medication dispensing data, and pharmacotherapeutic interviews), the clinical pharmacist identifies both intentional and unintentional non-adherence caused by adverse drug reactions, complex therapeutic regimens, insufficient patient knowledge of pharmacotherapy, or socio-economic factors. Based on the data obtained, the clinical pharmacist develops individualized adherence-enhancing strategies that include optimization of medication regimens, educational counseling, pharmacovigilance, and interdisciplinary communication with primary care physicians. It can be argued that the integration of clinical pharmacists into primary healthcare positively contributes to strengthening interprofessional collaboration between physicians and pharmaceutical professionals, which ultimately facilitates the achievement of target blood pressure levels, reduces the risk of cardiovascular complications, and improves the effectiveness of long-term hypertensive disease treatment. Effectively coordinated interdisciplinary communication between clinical pharmacists and primary care physicians enables more informed clinical decision-making and ensures continuity of care for patients with hypertensive disease.

Within the context of pharmacovigilance and pharmacotherapy safety, the clinical pharmacist plays a leading role in the identification, assessment, and prevention of adverse drug reactions in patients with chronic diseases, including hypertensive disease. Their activities are focused on the systematic analysis of individual treatment regimens, taking into account pharmacokinetic and pharmacodynamic properties of medications, potential drug–drug interactions, comorbid conditions, and age-related changes that may increase the risk of medication-related complications. The clinical pharmacist actively monitors safety by collecting and interpreting data on adverse effects, establishing causal relationships between antihypertensive drug use and observed reactions, and initiating pharmacotherapy adjustments through interdisciplinary collaboration with physicians. An important component of this activity is participation in national and local pharmacovigilance systems, increasing patient awareness of safe medication use and early recognition of adverse reactions, which collectively contributes to risk minimization, improved quality of pharmaceutical care, and optimized clinical outcomes.

The defined roles of the clinical pharmacist in the management of hypertensive disease and the systematization of the main functional areas of their activity in providing pharmaceutical care to patients with arterial hypertension at the primary healthcare level reflect a transition from the traditional pharmacist role, focused primarily on medication dispensing, to a clinically oriented pharmaceutical practice model. This model involves active participation in medication therapy management, monitoring of effectiveness and safety, and fostering patient adherence to treatment. Of particular importance are functions related to pharmacotherapy individualization and pharmacovigilance, which directly influence the reduction of medication-related risks and the improvement of antihypertensive treatment outcomes. The outlined functions emphasize the importance of interdisciplinary collaboration within the primary healthcare system, consistent with contemporary approaches to managing chronic non-communicable diseases. The implementation of clinically oriented pharmacist functions confirms the feasibility and relevance of developing integrated pharmaceutical care models in primary healthcare.

An important element of the modern healthcare system that contributes to improving the quality, effectiveness, and safety of medical and pharmaceutical care is the clinical patient routeway.

The clinical routeway for patients with arterial hypertension at the primary healthcare level in Ukraine is based on the following documents: «The evidence-based clinical guideline «Arterial Hypertension» (KN 2024-1581) and the Unified Clinical Protocol for Primary and Specialized Medical Care «Hypertensive disease (Arterial Hypertension)» (GS 2024-1581), approved by the Ministry of Health of Ukraine.

The clinical guideline represents an adaptation for the Ukrainian healthcare system of the «ESH Guidelines for the Management of Arterial Hypertension developed by the Task Force of the European Society of Hypertension and endorsed by the European Renal Association (ERA) and the International Society of Hypertension (ISH)» (2023). This guideline was selected as an example of best practice in the provision of medical care for patients with arterial hypertension and is based on evidence-based medicine data regarding the effectiveness and safety of medical interventions, pharmacotherapy, and organizational principles of care delivery [13].

The Unified Clinical Protocol for Primary and Specialized Medical Care «Hypertensive

disease (Arterial Hypertension)», developed in accordance with modern evidence-based medicine requirements, addresses the principles of diagnosis, treatment, and prevention of hypertensive disease (arterial hypertension) in Ukraine from the perspective of continuity and sequencing of healthcare services. The protocol is based on the adapted evidence-based clinical guideline «Arterial Hypertension» [14].

Based on the content analysis [1,3,4,5,6,12,16,32], organizational models for the management of patients with arterial hypertension at the primary healthcare level were analyzed. A comparative characterization of these organizational models, along with their advantages and disadvantages, is presented in Table 2.

The analysis of organizational models for managing patients with arterial hypertension at the level of primary health care demonstrates that the classical physician-centered model is the easiest to implement; however, it fails to ensure an adequate level of effectiveness due to excessive physician workload and low patient adherence to treatment. In contrast, the team-based (multidisciplinary) model and the shared care model show higher effectiveness owing to a multidisciplinary approach, although they require additional resources and coordination. The conducted analysis of organizational models for managing patients with arterial hypertension at the primary care level made it possible to identify key problems in existing patient routeways. The main challenges include limited access to medical care (in particular, the lack of cardiologists in rural and remote regions), insufficient communication between family physicians, cardiologists, and pharmacists/ clinical pharmacists, and low patient adherence to therapy. From our perspective, models with active involvement of pharmacists and the use of digital technologies are particularly promising for Ukraine, as they improve access to care, enhance blood pressure control, and contribute to the development of a patient-centered health care system.

To improve the quality and accessibility of medical and pharmaceutical care, expanding the role of clinical pharmacists within the primary health care system is of strategic importance. Such an approach enables a reduction in physician workload, improves patient adherence to pharmacotherapy, facilitates timely identification of potential risks and adverse drug reactions associated with antihypertensive medications, and supports the integration of pharmaceutical care into a multidisciplinary team. This aligns with modern public health standards and the principles of sustainable development of the health care system.

Table 2

Comparative characteristics of organizational models for the management of patients with arterial hypertension at the primary healthcare level

Model	Characteristics	Advantages	Disadvantages
Classical model (physician-centered)	Patient management exclusively by a family physician	Simplicity of organization; clear and understandable for patients	High workload for the physician; low effectiveness in chronic disease management; poor patient adherence
Team-based (multidisciplinary) model	Involvement of a physician, nurse, pharmacist/clinical pharmacist, and, if needed, a cardiologist, dietitian, psychologist	Reduced physician workload; improved blood pressure control and quality of care	Requires additional resources and coordination
Shared care model	Joint follow-up by a family physician and a cardiologist	Optimal for high-risk patients; reduced complications	Limited availability of specialists, especially in rural areas
Model with active involvement of a clinical pharmacist	Pharmacist/clinical pharmacist monitors adherence, educates patients, and tracks drug–drug interactions	Increased adherence to therapy; reduced uncontrolled arterial hypertension	Requires expansion of pharmacists'/clinical pharmacists' competencies and improvement of the regulatory framework
Telemedicine / digital model	Use of mobile applications, online consultations, electronic patient records	Convenience; continuous monitoring; improved access in remote areas	Digital divide; need for technical infrastructure
Patient-oriented model (self-management)	Patients actively monitor blood pressure, keep diaries, and implement lifestyle changes	Enhances patient responsibility; supports long-term control	Requires high patient motivation; risk of poor adherence

In this context, particular attention should be paid to evidence-based clinical guidelines developed by the European Society of Cardiology (ESC) and the American Heart Association (AHA), as well as U.S. clinical guidelines for pharmacists on the management of patients with cardiovascular diseases, including pharmacist-led counseling aimed at rehabilitation and prevention of secondary cardiovascular complications. The ESC/AHA clinical guidelines incorporate principles of rational pharmacotherapy and consider potential drug–drug interactions. U.S. clinical guidelines for pharmacists provide more systematic guidance on medication use from the perspective of dosing, frequency and duration of administration, as well as potential drug interactions and adverse drug reactions. These documents emphasize the importance of collaborative practice between physicians and pharmacists within multidisciplinary teams [2].

The implementation of a multidisciplinary model with the active involvement of family physicians, nurses, clinical pharmacists, and, when necessary, cardiologists, dietitians, and psychologists is expected to reduce the workload of primary care physicians, improve the quality of blood pressure control, and decrease the risk of cardiovascular complications.

In the digital environment, the development of digital tools – such as electronic health records, telemedicine and telepharmacy services, mobile applications for blood pressure monitoring, and online platforms for ordering antihypertensive medications – plays a key role in improving the accessibility and effectiveness of medical and pharmaceutical care for patients with arterial hypertension. The implementation of electronic health records enables convenient and secure information exchange between patients and various health care professionals, facilitates data integration, and supports timely clinical decision-making. Telemedicine consultations allow patients to receive prompt support regardless of geographical location, reduce the burden on primary care services, and contribute to the early detection of complications. Telepharmacy enables patients with arterial hypertension to receive remote pharmaceutical counseling, timely adjust therapy, and monitor adverse effects of antihypertensive medications. This approach improves adherence to pharmacotherapy, enhances blood pressure control, and reduces the risk of cardiovascular complications. Mobile applications for self-monitoring of blood pressure encourage active patient participation in disease management, increase treatment adherence, and provide clinicians with real-world data for therapy adjustment. Online services for ordering antihypertensive medications ensure rapid and convenient access to essential medicines without the need to visit a pharmacy, thereby promoting regular medication intake, reducing the risk of missed doses, and improving the effectiveness of blood pressure control. Collectively, these digital solutions contribute to improved quality of medical and pharmaceutical care, optimization of health care resources, and effective implementation of public health strategies.

Supporting a patient-centered approach through educational programs and the development of self-monitoring skills is essential for effective management of arterial hypertension. Educating patients on blood pressure measurement, symptom recognition, and the correct use of antihypertensive medications enhances their responsibility for their own health. Motivation to adopt lifestyle modifications – including balanced nutrition, regular physical activity, stress reduction, and decreased salt intake –contributes to blood pressure stabilization, reduction of cardiovascular risk, and improvement in the quality of life of patients with arterial hypertension.

Thus, the optimal direction for the development of hypertension management at the primary health care level involves the integration of a team-based approach, telemedicine and telepharmacy tools, and patient self-management. This integrated model is consistent with contemporary public health strategies and the principles of sustainable development of the health care system.

The practical recommendations proposed for optimizing the management of patients with arterial hypertension at the primary care level in Ukraine are presented in Figure 2.

The conducted analysis of organizational models for managing patients with arterial hypertension at the primary health care level, combined with a comparison of existing patient routing algorithms, allowed the identification of potential intervention points for clinical pharmacists. This analysis revealed key issues in the current routing system, including barriers to accessing medical care (such as the lack of cardiologists in rural and remote regions of the country), insufficient communication between family physicians, cardiologists, and clinical pharmacists, and low patient adherence to treatment and preventive measures. In our view, the primary strategy for optimization is the implementation of structured clinical pathways for patients with arterial hypertension at the primary health care level. Such an approach is expected to reduce the incidence of cardiovascular complications and hospitalizations, optimize the utilization of health care system resources,

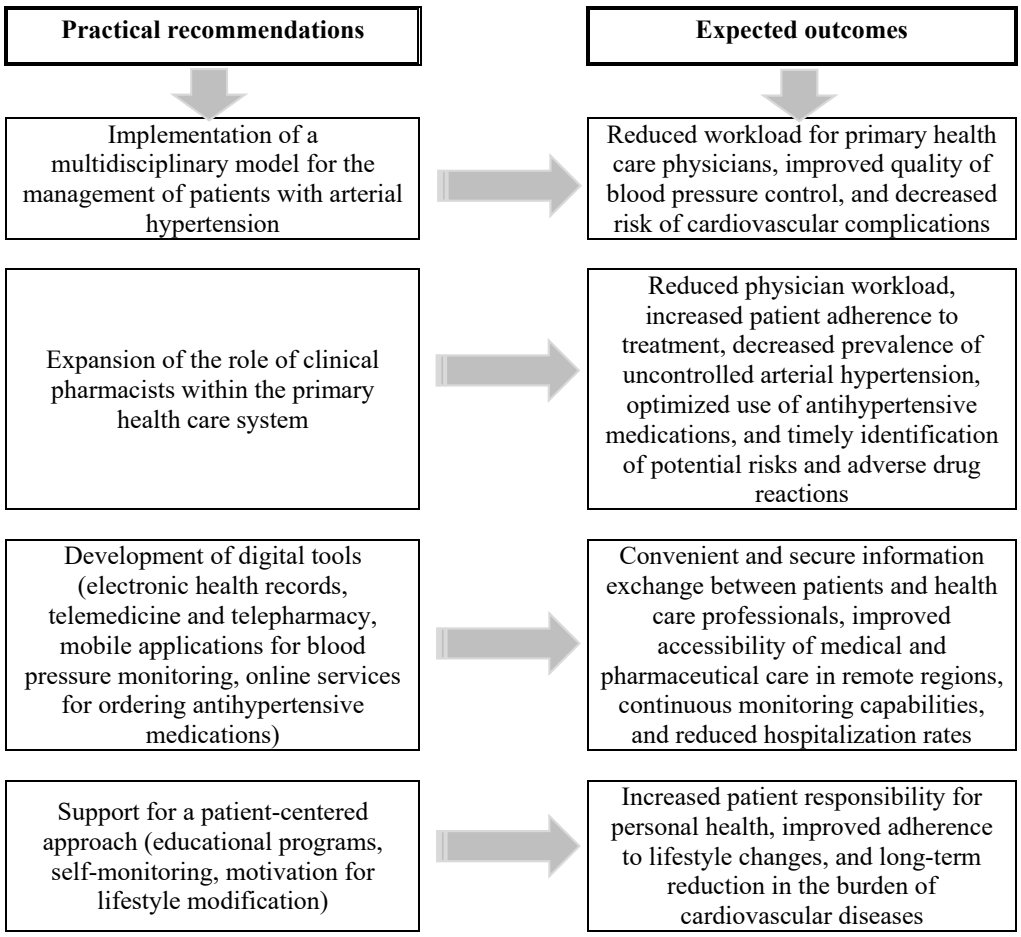


Fig. 2. Practical recommendations for optimizing the management of patients with arterial hypertension at the level of primary health care in Ukraine

and enhance the effectiveness of preventive interventions. In the long term, the adoption of clinical pathways is anticipated to contribute to a reduction in population mortality from cardiovascular diseases, including hypertensive disease, foster a culture of responsible self-care, and strengthen the resilience of the public health system. Accordingly, we have developed a clinical pathway for patients with arterial hypertension at the primary health care level (Figure 3), which integrates a multidisciplinary team approach, telemedicine and telepharmacy, as well as patient self-management.

The optimization of patient pathways for arterial hypertension at the primary health care level involves a transition from the traditional physician-centered model to more comprehensive approaches that integrate a multidisciplinary team, digital technologies, and active patient engagement. The involvement of a clinical pharmacist in the routing of patients with arterial hypertension within primary care is expected to enhance the effectiveness of blood pressure control, pharmacotherapy, and preventive interventions; reduce the risk of cardiovascular complications, hospitalizations, and mortality; improve patients' quality of life; optimize the use of healthcare system resources; promote a culture of patient responsibility for their own health; and strengthen the resilience of the socio-economic determinants of the national public health system [27].

4. Conclusions and prospects for further research:

1. The scientific and practical rationale for involving clinical pharmacists in the management of pharmacotherapy for hypertensive disease (arterial hypertension) and their integration into primary healthcare for patients has been substantiated.

2. The main roles and functional directions of clinical pharmacists in managing medication therapy, enhancing patient adherence, and improving blood pressure control have been analyzed.

3. The feasibility of involving clinical pharmacists in optimizing patient pathways for arterial hypertension at the primary healthcare level has been justified, and practical

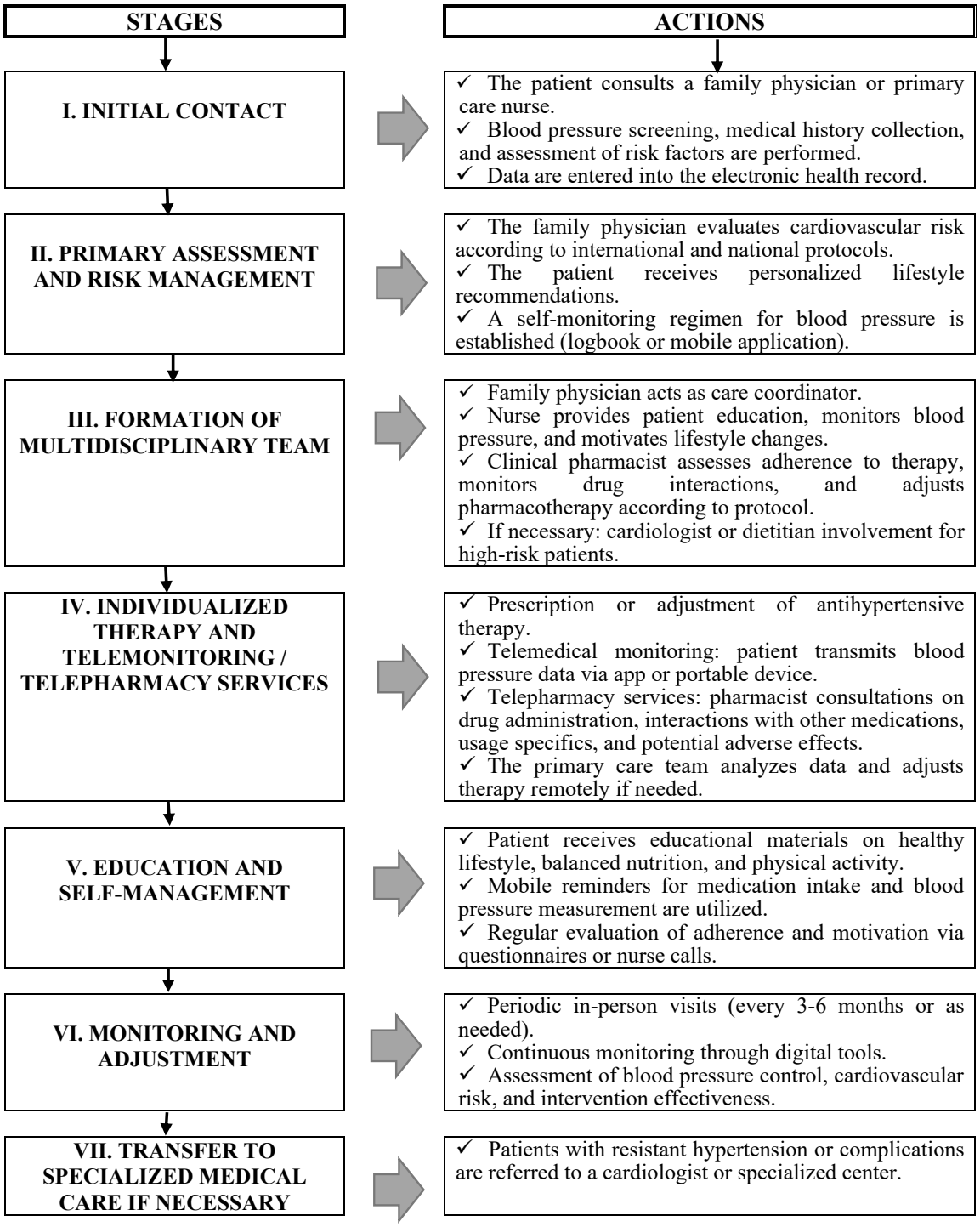


Fig. 3. Clinical pathway for patients with arterial hypertension at the primary care level

recommendations for integrating pharmaceutical care have been proposed.

4. Prospects for further research include the development and testing of systematic approaches to integrate clinical pharmacists into primary healthcare, including regional collaboration protocols, digital platforms for coordinating pharmacotherapy, and interprofessional training programs. It is advisable to assess the impact of such models on clinical, economic, and social outcomes, including the reduction of hypertension-related complications, increased patient satisfaction, and the efficiency of resource utilization within the national healthcare system.

Перспективи подальших досліджень полягають у розробці та апробації системних підходів до інтеграції клінічних фармацевтів у первинну медичну допомогу, включно з регіональними протоколами співпраці, цифровими платформами для координації

фармакотерапії та міжпрофесійними навчальними програмами. Доцільно оцінити вплив таких моделей на клінічні, економічні та соціальні показники, включно зі скороченням ускладнень гіпертонії, підвищенням задоволеності пацієнтів та ефективністю ресурсів національної системи охорони здоров'я.

Обмеження дослідження. Проведене дослідження має обмеження, яке слід враховувати при інтерпретації отриманих результатів. Застосований метод анкетного опитування пацієнтів з артеріальною гіпертензією може бути пов'язаний із ризиком суб'єктивності їх відповідей. Незважаючи на зазначені обмеження, отримані результати мають практичну цінність для обґрунтування доцільності інтеграції клінічного фармацевта у систему первинної медичної допомоги та подальшого вдосконалення маршрутизації пацієнтів з артеріальною гіпертензією.

Конфлікт інтересів

Відсутній.

Використання штучного інтелекту

З метою перевірки граматики, стилістичного редагування матеріалу в процесі підготовки статті було використано інструмент штучного інтелекту. Застосування штучного інтелекту обмежувалося редагування тексту та не впливало на інтерпретацію наукових даних, формулювання висновків або змістовну частину дослідження.

Первинні дані та матеріали

Інформаційні ресурси включали бази даних PubMed, Cochrane та Embase, а також національні та міжнародні нормативно-правові й клінічні джерела. Зокрема, використано клінічну настанову, засновану на доказах «Артеріальна гіпертензія» (КН 2024-1581), уніфікований клінічний протокол первинної та спеціалізованої медичної допомоги «Гіпертонічна хвороба (артеріальна гіпертензія)» (ГС 2024-1581), накази Міністерства охорони здоров'я України, а також міжнародні клінічні настанови та рекомендації Європейського товариства кардіологів/Європейського товариства гіпертензії (ESC/ESH), Всесвітньої організації охорони здоров'я (WHO) та Міжнародного товариства гіпертензії (ISH).

Інформація про фінансування

Дослідження здійснено без фінансової підтримки.

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Дата надходження статті: 14.03.2026
Дата надходження виправленої версії статті: 30.03.2026
Дата прийняття статті: 07.04.2026
Дата публікації статті: 05.06.2026