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DETERMINATION OF THE SOCIALLY ORIENTED ROLE OF PHARMACISTS IN THE PREVENTION, DIAGNOSIS AND TREATMENT OF PATIENTS WITH VIRAL HEPATITIS

Alla Kotvitska, Alina Volkova, Almira Nozdrina, Iryna Surikova

Viral hepatitis (VH) is one of the most significant medical and social problems worldwide, posing a global threat to public health.

***The aim of the study** was to determine the socially oriented role of pharmacists in the prevention, diagnosis and treatment of patients with VH, in particular in the implementation of decentralization of VH diagnostic services in Ukraine.*

***The study was based** on statistical reports of the WHO, the Public Health Centre of the Ministry of Health of Ukraine, international WHO guidelines on the diagnosis and pharmacotherapy of viral hepatitis, and scientific publications.*

***Results of the study.** Taking into account the results of the analysis of world experience and based on the WHO Concept in cooperation with FIP 'Seven Star Pharmacist' and its modern interpretation, we have identified the current role of pharmacists in the prevention, diagnosis and treatment of patients with VH.*

Based on the recommendations of the WHO and the Ministry of Health of Ukraine, which define the pharmacist as a link in the support of pharmacotherapy for patients with VH, a model of information and advisory pharmaceutical service is proposed, which provides for the involvement of resources of the state and regional levels at the stages of need assessment, planning and control of the service, resources of health care facilities and pharmacies, and the stages of planning and implementation of the pharmaceutical service.

Noting the successful international experience and peculiarities of modern pharmaceutical care provided to patients with hypertension, we propose an adapted model of patient-pharmacist-physician interaction. This model is based on the fact that the pharmacist is one of the professional implementers of the state policy on providing the population of Ukraine with medicines and medical devices, and through the implementation of interaction with the patient and the doctor, based on the basic principles we have developed.

Thus, the analysis of approaches to defining the socially oriented role of pharmacists in the prevention, diagnosis and treatment of patients with hypertension has become the basis for the development of models for the provision of information and advisory pharmaceutical services and a model of patient-pharmacist-physician interaction.

***Conclusions**. The implementation of the model of information and advisory pharmaceutical service and the model of patient-pharmacist-physician interaction in practice will facilitate the timely detection of threatening symptoms of a socially dangerous disease and, accordingly, the diagnosis of potential VH patients and their visit to a doctor and, as a result, will be a way to prevent irrational self-medication and ensure timely, economically justified pharmacotherapy for this category of patients*

***Keywords:** viral hepatitis, diagnosis, role of pharmacist, pharmaceutical information service, pharmaceutical care*

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1. Introduction

Parenteral viral hepatitis (VH) is one of the most significant medical and social problems worldwide, posing a global threat to public health, and which, according to WHO, should be given special attention in every country. The spread of such socially dangerous diseases as hepatitis B virus (HBV) and hepatitis C virus (HCV) among the population poses a significant risk to the national security of the country and is one of the main causes of disability, health, as well as an increase in disability and mortality rates [1–4]. The small number of people diagnosed with VH in the world is of concern, which in 2019 was 21 % for HCV patients and 10 % for HBV patients [1, 2, 5]. However, there has been a small but consistent improvement in diagnosis and treatment coverage, according to the WHO report of 2024. Thus, the rate of HBV diagnosis increased from 10 to 13 %, and HCV diagnosis from 21 to 36 % [1, 2, 5].

Since timely early diagnosis can prevent the development of complications associated with infection and further transmission of the virus, WHO recommends testing of people at high risk of infection and notes the need to create free access to VH testing for all who need it and the possibility of its implementation in combination with prevention, care and treatment services [6, 7]. For this reason, reports have repeatedly emphasized the importance of decentralizing VH diagnostic services.

The analysis of a systematic review of publications on VH testing in general pharmacies, which contains data from such modern well-known databases as Medline, Em-

base, Cochrane CENTRAL and Global Health and was published in the international journal Lancet in March 2024 [8] showed that the level of VH testing in pharmacies is higher compared to other facilities, which in turn supports the hypothesis that pharmacies are an acceptable place for VH testing, especially when there is a good relationship between the pharmacist and the patient [8–12].

Researchers [13] reported that pharmacist-led HCV screening was successfully implemented in a community pharmacy. Patients' self-assessment of their knowledge of VH after testing and pharmacist consultation was significantly higher than before testing.

Studies conducted by another group of researchers [14, 15] demonstrated that trained and motivated pharmacists, in partnership with the Department of Health, can provide the necessary rapid screening for HCV antibodies in potentially high-risk patients who are not currently on treatment. Pharmacists also confirmed the feasibility of incorporating HCV screening into their daily work in the pharmacy. Therefore, it can be concluded that pharmacies are suitable places for screening and providing pharmaceutical care due to easy access of patients to experienced pharmacists and the convenient location of pharmacies.

The aim of the study was to determine the socially oriented role of pharmacists in the prevention, diagnosis and treatment of patients with VH, in particular in the implementation of decentralization of VHdiagnostic services in Ukraine.

2. Research planning (methodology)

In order to achieve the above goal, we have developed an algorithm for conducting the study, which consists of the following stages:

Stage I. Collection of data presented in the specialized literature and critical analysis of the world experience regarding the current role of pharmacists in the diagnosis, prevention and pharmacotherapy of patients with VH.

At this stage of the work, we studied scientific publications for the period 2017-2024, which are presented in publications indexed in international scientometric databases, including Scopus and Web of Science, as well as Pubmed, ScienceDirect, and Elsevier. The scientific search was conducted using the keywords «viral hepatitis», «role of pharmacist», «diagnosis of VH», «testing for VH», «prevention of VH», «pharmaceutical service», «interdisciplinary approach». Materials that contained duplicate information or commercial material, as well as individual assessments of measures involving pharmacists in the diagnosis, prevention or pharmacotherapy of VH, were excluded from the scientific search.

Stage II. The socially oriented role of the pharmacist must be determined in accordance with the current needs to ensure timely diagnosis and pharmacotherapy of patients with VH, as well as prevention of this infectious disease.

Stage III. Based on the results of the systematization of own research and analysis of international experience on this issue, develop models for the provision of information and consultation services by pharmacists.

Stage IV. Development and substantiation of a model of patient-pharmacist-physician interaction in the provision of pharmaceutical care adapted to the needs of patients with VH.

Stage V. Presentation of the study results and summarisation of the findings.

3. Materials and methods

The study was based on WHO statistical reports [1–3, 5, 16] (references), the Public Health Centre of the Ministry of Health of Ukraine [17], WHO international guidelines on the diagnosis and pharmacotherapy of viral hepatitis [4, 18, 19], and scientific publications [11, 12, 20–25].

The analysis of these materials was carried out using general theoretical methods of analysis: content analysis and comparative method (study of scientific publications, problem statement, study of research objects); historical, logical, descriptive generalization and abstract modelling, as well as graphical method (development of components and stages, construction of models for determining the role of a pharmacist).

The standard Microsoft Office software package was used to process the data from the specialized literature.

4. Results of the study

The analysis of publications [9, 11, 12, 20, 22–24, 26–31] on the world experience of VH screening showed that such screening measures at the pharmacy level are successful if the pharmacist is aware of the specifics of the diagnostic procedure and knows the sequence of their actions, which is in line with WHO recommendations on decentralization of VH testing services.

According to studies [10, 20, 22, 24, 28], the pharmacist primarily plays a communicative role, providing pharmacy visitors with qualified, informed, reliable information about medicines, their side effects and drug interactions, which prevents patient misinformation, ensures compliance and contributes to the achievement of therapeutic effect in complex pharmacotherapy regimens that are typical for the management of patients with VH.

The inclusion of pharmacists in the group of specialists supporting patients with VH during treatment has demonstrated improved adherence to treatment and increased rates of sustained virological response, which indicates an effective outcome of pharmacotherapy [26, 29, 30, 31]. Thus, the benefits of pharmacists' participation in the treatment of VH have been demonstrated in different settings, including as part of a multidisciplinary team with the interaction of pharmacists and healthcare professionals.

The analysis of foreign publications on the study of values and benefits, ease of use and cost-effectiveness of self-testing for VH in different settings and population groups, the results of which were also noted in WHO reports [3, 6, 7] showed the following:

– a significant proportion of the population is willing and able to perform VH self-testing with minimal external support;

– self-testing for VH is acceptable and feasible in different populations and settings;

– self-testing for VH is likely to increase social equity by reaching those who would not otherwise be tested [3].

Taking into account the results of the analysis of the global experience on the role of pharmacists in the care of patients with VH and based on the WHO Concept in cooperation with FIP 'Seven Star Pharmacist' and its modern interpretation, we have identified the current roles of pharmacists in the prevention, diagnosis and treatment of patients with VH (Fig. 1).

Thus, the results of the analysis of publications on the diagnosis of VH indicate that pharmacies can serve as a place to identify patients with VH, especially among the most vulnerable populations, such as low-income people and people who inject drugs, and pharmacists can provide information support in the prevention of this disease and its transmission, as well as refer patients to health care centres. However, it should be noted that one of the conditions for the effective implementation of such measures should be the readiness of pharmacists to provide such services, including awareness of the symptoms of VH and methods of its diagnosis.

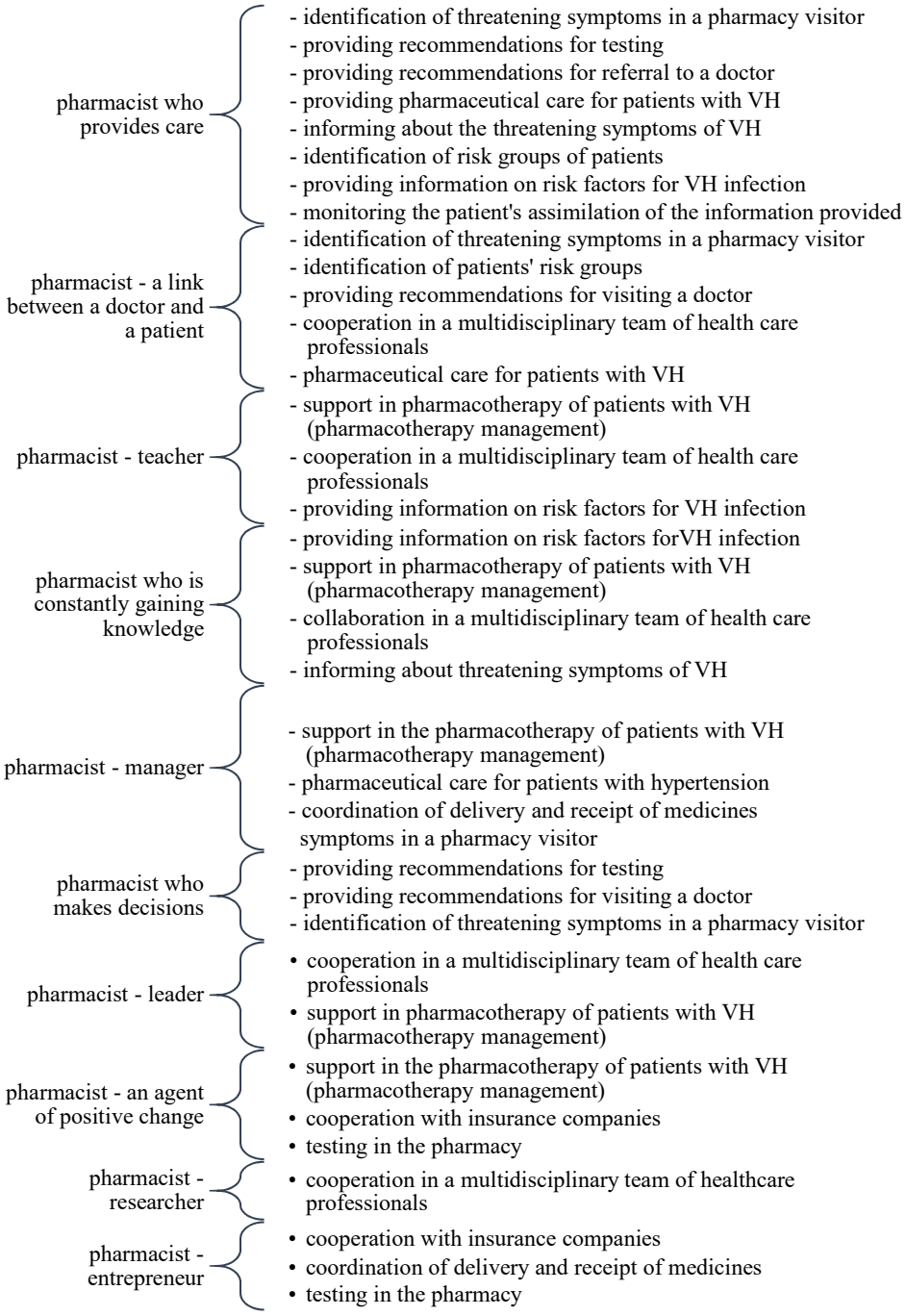

Fig. 1. Current roles of pharmacists in the prevention, diagnosis and treatment of patients with VH

Previous studies conducted by the authors [32] indicate that ordinary citizens have a positive attitude towards VH testing (90.2 % of respondents are ready to buy a self-diagnostic test in a pharmacy if they suspect VH), which can be considered a favourable factor for decentralization of testing, despite the fact that a rather low level of awareness of the possibilities of getting tested by a family doctor or self-testing was found, which is quite alarming. According to the results of the surveys, it should be noted that the majority of respondents were aware of the ways of VH infection (75 %), but even if they had objective reasons to be at risk, they did not realize this and did not consider it necessary to undergo diagnostics.

Given the peculiarities of the onset and course of the disease, treatment of VH without effective social campaigns to raise public awareness and expand screening would be an ineffective health policy strategy [5, 7, 16], which is confirmed by the state policy of classifying VH as a socially dangerous disease and the active development of programmes by governmental and non-governmental organizations to inform the population about this disease [16, 17].

Since current WHO and MoH CDC recommendations are aimed at decentralizing services for the diagnosis and treatment of VH [6, 7], we believe that to achieve this goal, it is necessary to focus on the possibility not only to be diagnosed by a family doctor,

but also on the possibility of self-diagnosis, in particular in pharmacies.

Taking into account the social significance of such a disease as VH, the prevalence, diagnosis and duration of treatment, as well as the fact that a certain number of patients are socially vulnerable [3, 16, 33], we developed a model of information and consultation pharmaceutical service (Fig. 2) based on the study of positive international experience and evidence that pharmacist support and assistance increased the number of patients who received a positive, lasting effect of pharmacotherapy [10, 11, 15, 22, 24–30].

The proposed model for the creation and provision of information and counselling pharmaceutical services for VH is based on the main tasks that need to be addressed to ensure timely diagnosis and initiation of treatment of patients with VH, in particular to increase the coverage of all social groups with testing, reduce the number of people infected with VH, ensure the quality and effectiveness of pharmaceutical services for patients with VH, raise public awareness of the prevention of VH infection, prevention, timely detection and treatment of VH infection.

The purpose of this model is to organize the work of all involved participants (from the state level to the level of medical and pharmaceutical care) in such a way as to be able to achieve the main tasks related to the elimination of VH as efficiently as possible.

In order to achieve this goal, it is proposed to develop standardized procedures for the provision of information and consultation services, develop training programmes for multidisciplinary team members who will be involved in the provision of this service in different healthcare facilities, and other components of the process, as shown in Fig. 2.

The implementation of the pharmaceutical information and advisory service mechanism involves defining the desired clinical and economic goals, as well as assessing the need for diagnosis and treatment with the available resources of the healthcare system at all levels. Project planning involves identifying the competencies and skills required for the people involved and conducting appropriate training, as well as developing appropriate service standards. Implementation of the service involves ensuring the continuous professional development of pharmacists involved in this service and their active communication with other members of the multidisciplinary team of specialists in the treatment of patients with VH, as well as overcoming possible barriers. The effectiveness of the service will be monitored in accordance with the target indicators.

The results of the preliminary stage of the study, which included a survey of the Ukrainian population on awareness of VH and readiness for its diagnosis at the pharmacy level or by self-testing, showed that more than 86 % of respondents out of 1214 respondents noted their readiness to undergo self-testing, especially in the presence of symptoms (90.2 % of respondents) [9]. However, patients are not always able to identify and realize that they or their loved ones have them and understand the need to see a doctor, so at this stage, a pharmacist can help as an intermediate link between the patient and the doctor.

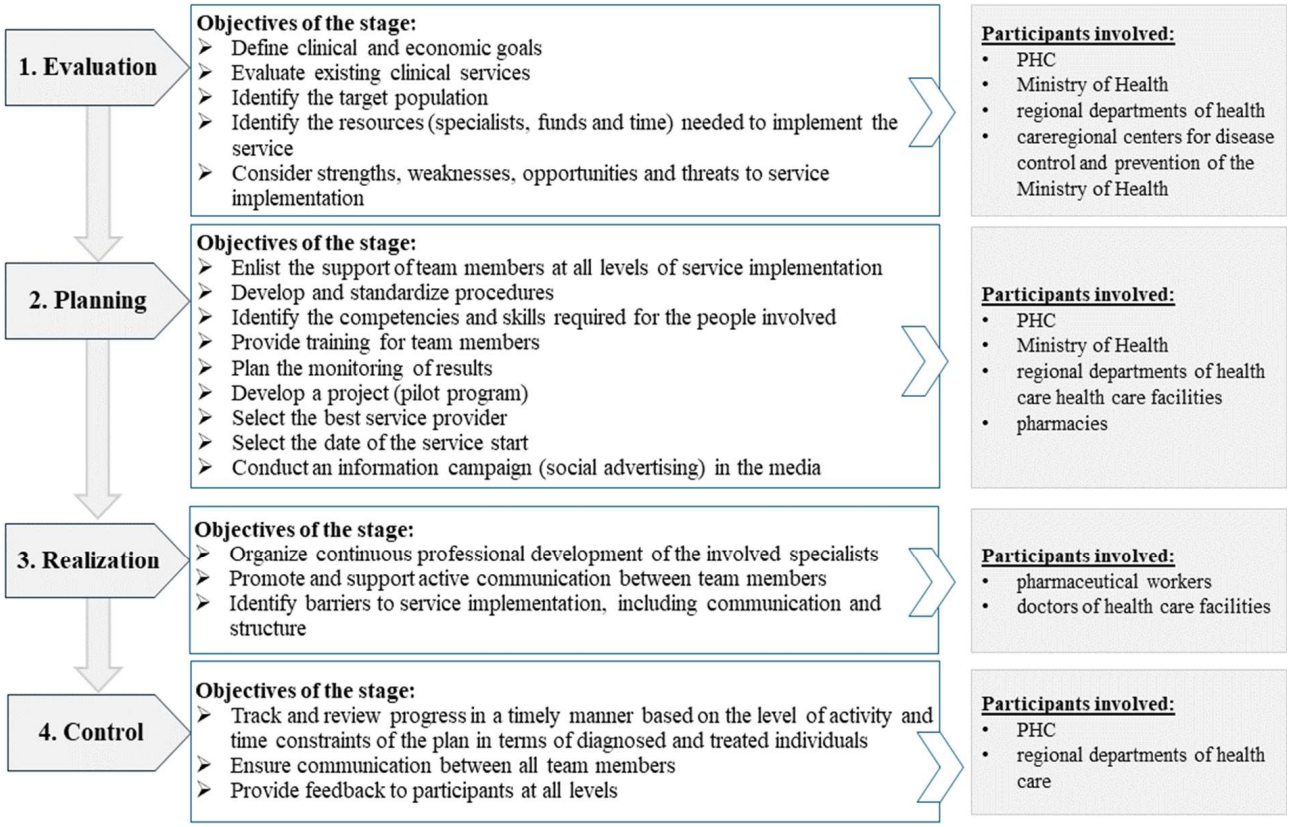

Fig. 2. Model for the creation and provision of pharmaceutical information and counselling services for VH

In the proposed model, the pharmacist is involved in the process of providing pharmaceutical services to patients, and therefore, the specialist must have the necessary knowledge and skills in modern approaches to diagnosis and therapy. At the same time, the pharmacist's function in accordance with good pharmacy practice, such as continuous professional development, is implemented, and the social burden is fulfilled, in particular, participation in government programmes to support infectious patients. At the implementation stage, the pharmacist's tasks are to provide information materials to the patient, enter information into the accounting system, and provide patient support.

In our opinion, there are significant advantages to providing this information and advisory service. For example, if implemented, it improves the level of qualification of pharmacists, which enables the pharmacy to build patient loyalty through the competence of the staff and the provision of a quality additional service. Since the number of pharmacies far exceeds the number of medical institutions, the community level provides a wider coverage of the population with information services through the services of pharmacies. In turn, timely diagnosis of VH allows for the starting of treatment as early as possible so that the carrier of the infection no longer poses a hidden threat to others. Public awareness and prevention, as well as timely receipt of pharmacotherapy by those who have been confirmed to be HCV or HBV positive, will predictably lead to a decrease in the number of newly infected people.

However, taking into account the conditions of pharmaceutical care provision in a pharmacy, we can assume that there are obstacles to the provision of quality information and advisory services. For example, if the number of pharmacists in a pharmacy is insufficient, the overall workload of each specialist will increase, given the lack of time to provide pharmaceutical care and services to visitors, which will lead to fatigue and inadequate quality of service. If there is no desire and opportunity for the professional development of pharmacists, as well as a lack of motivation, there is likely to be low awareness on the part of the healthcare professional and an imperfect 'route of care' for patients. This situation will lead to an increase in the time and effort required to serve each patient.

In turn, the existence of a certain stigma in society regarding VH can cause shyness on the part of the patient when seeking medical attention and a lack of desire to disclose the symptoms of the disease, and on the part of the pharmacist - a personal negative attitude towards the patient.

Noting the successful international experience and peculiarities of pharmaceutical care, we propose a model of patient-pharmacist-physician interaction adapted to the current needs of the Ukrainian healthcare system in the timely diagnosis and treatment of patients with VH. The model is based on the fact that a pharmacist is a professional implementer of the state policy on providing the population of Ukraine with medicines and medical devices, and through the implementation of interaction with a patient and a doctor, can contribute to the quality pharmacotherapy of patients with VH, guided by the basic principles we have proposed:

– respect. Each patient has his/her own opinion, must make the final decision, and must be treated with care;

– sensitivity. Pharmacists and doctors should be polite, careful and tactful in their communication with patients, explaining the importance of timely diagnosis and/or risk factors for the disease;

– humanism. Demonstration of tolerance, empathy for the patient;

– cohesion (of all healthcare facility staff). Understanding of a common goal between all participants in the process, mutual assistance, mutual support and interaction;

– professional competence of both pharmacists and doctors. Availability of necessary knowledge, skills, abilities, critical thinking, continuous professional development;

– relevance. The importance of timely informing patients about risk factors and threatening symptoms, the importance of timely diagnosis;

– evidence-based information. All information provided should be objective, accurate, and adequate;

– accessibility of medical and pharmaceutical services for all segments of the population – determines the effectiveness of the healthcare system. Improving accessibility is a priority for the development of state healthcare policy.

The purpose of the model of patient-pharmacist-physician interaction in the provision of pharmaceutical services for the diagnosis of VH in a pharmacy, which is presented in Fig. 3, is the timely detection of dangerous symptoms in patients at the primary stages of the disease, the positive influence of healthcare professionals on self-medication, and support of patients to achieve an effective result on a long-term pharmacotherapy pathway.

The model consists of subjects and stages of their interaction, developed principles and expected results. The actors include a patient with VH, a pharmacist in a pharmacy who will provide pharmaceutical services and care, and a physician and a specialist in a healthcare facility. The main four stages involve interaction between the following subjects: patient and pharmacist, pharmacist and doctor, doctor and patient, pharmacist and patient during pharmacotherapy. It should be noted that each of the stages of interaction between the subjects is based on the proposed principles of care. In turn, it is assumed that each stage leads to a certain specified result.

At the first stage of the interaction between a patient and a pharmacist, the patient visits a pharmacy and receives a consultation from a pharmacist, who, by asking clarifying questions, determines the patient's need for VH testing. This process is based on the principles of relevance (the importance of timely informing patients about risks and symptoms, the need for timely diagnosis), accessibility (pharmaceutical services should be accessible to all segments of the population) and evidence-based information (information should be objective, accurate, understandable and adequate). This helps detect dangerous symptoms in a timely manner, prevent irrational self-medication, and reduce costs.

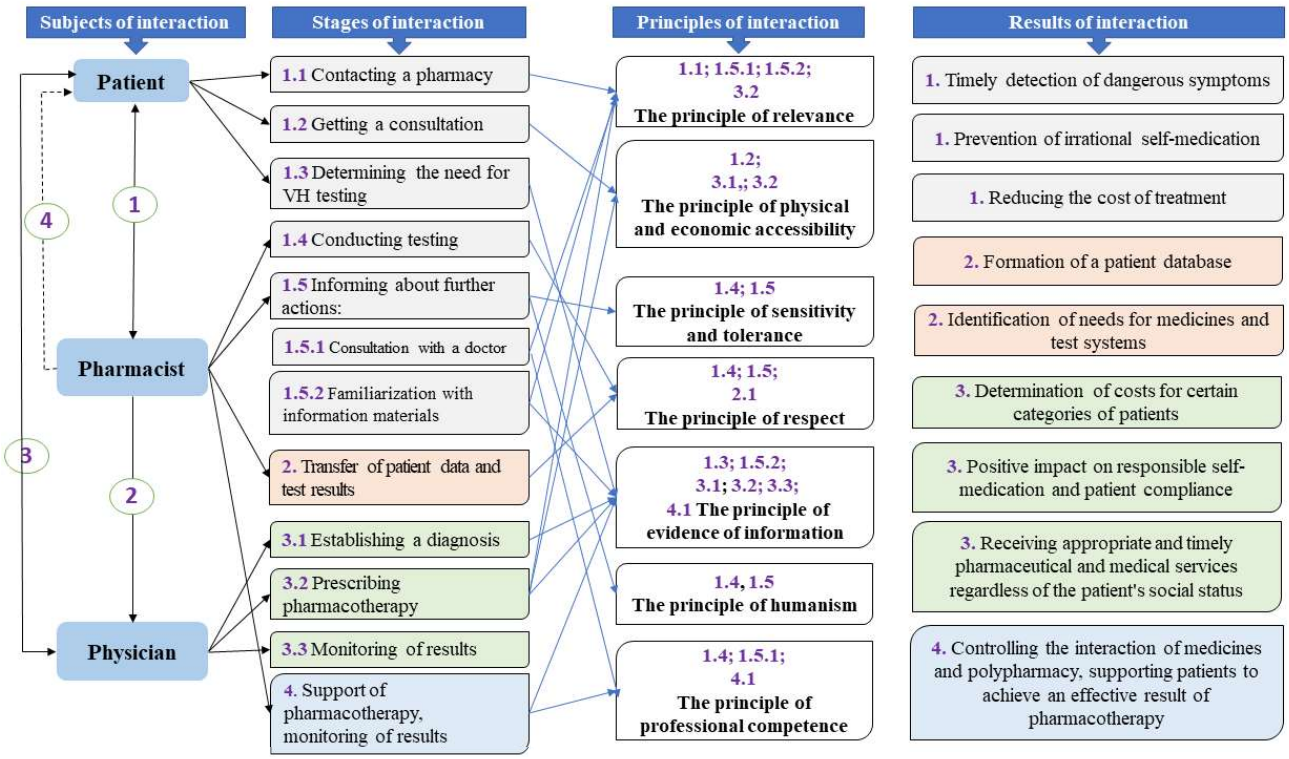

Fig. 3 An adapted model of patient-pharmacist-physician interaction in the provision of pharmaceutical services for the diagnosis of VH in a pharmacy: 1 − patient-pharmacist interaction; 2− pharmacist-physician interaction; 3− physician-patient interaction; 4 − pharmacist-patient interaction during pharmacotherapy

At the same stage, the pharmacist determines the need for VH antibody testing during the consultation. The next step is to inform the patient about further actions depending on the test result, such as a recommendation to see a doctor, information materials about risk factors, and/or the patient's route in case of suspected VH infection. These actions are based on the principles of respect (taking into account the individual needs of the patient), sensitivity (politeness and tactfulness in communicating with patients), humanism (empathy for the patient), professional competence (possession of the necessary knowledge and skills), relevance, evidence-based information and accessibility.

The second stage involves the interaction between a pharmacist and a doctor, which consists in the transfer of patient data with test results from the pharmacist to the doctor. This process is based on the principles of respect, professional competence and relevance of information. The interaction can result in the formation of a patient registry, as well as the identification of the need for medicines and test kits for HBV and HCV.

The third stage involves interaction between the doctor and the patient, including diagnosis, prescription of pharmacotherapy and monitoring of treatment results. This stage is also based on the principles of relevance, evidence-based information and professional competence. As a result, it is expected to have a positive impact on responsible self-treatment, patient adherence to prescribed treatment, and the calculation of treatment costs for different categories of patients. Since VH can infect any person, including socially vulnerable groups, entering a patient in the register of patients and providing them with the necessary medicines at public expense allows to ensure an appropriate level of pharmaceutical and medical services regardless of social status.

In the fourth stage, the pharmacist continues to interact with the patient, providing support for pharmacotherapy and monitoring the results of treatment. It is believed that pharmacists will be able to effectively administer the treatment process, preventing unwanted drug interactions and polypharmacy, as well as assessing factors that affect drug metabolism and excretion. According to the results of the analysis of international experience, this role of a pharmacist in providing pharmaceutical care to patients VH is an effective step towards ensuring the effective movement of patients through the 'treatment cascade' – from diagnosis to cure, facilitating their full course of treatment, and resulting in an increase in the number of sustained virological response rates as an indicator of effective pharmacotherapy, which, accordingly, ensures an increase in the number of cured patients.

5. Discussion of the study results

We believe that the provision of information and counselling pharmaceutical services can become a competitive advantage of a pharmacy and an important part of the work of a pharmacist, who is an important link in health care, especially in conditions of limited financial support for the industry. Given that Ukraine is currently one of the countries with low funding for health care costs [34], screening for VH among the population at risk and diagnosing patients with VH at early stages will save limited health care resources and patient costs by timely initiation of pharmacotherapy and preventing the devel-

opment of complications such as liver cirrhosis and hepatocellular carcinoma (primary liver cancer).

Adapting the foreign experience of involving pharmacists in the diagnosis of VH and support of pharmacotherapy for patients with VH, we believe that pharmacists will play a crucial role in moving patients through the "treatment cascade" - from diagnosis to cure, facilitating their full course of treatment, and as a result, increasing the number of sustained virological response rates as an effective result of pharmacotherapy, and, accordingly, increasing the number of cured patients.

In our opinion, it is the expansion and decentralization of VH testing services that should be supported and implemented through a media campaign. By combining all components, it is possible to achieve the elimination of HCV and HBV in Ukraine, which is the main goal of both the Ukrainian VH strategy and the WHO strategy. In the future, decentralization of testing and an information campaign in cooperation with pharmacists will help reduce the burden on the economic system of providing VH patients with testing and treatment at the expense of the state.

Practical relevance. VH infections are socially dangerous diseases, in particular, HCV, also known as "gentle killers" because the infected person may not even be aware of their disease, have no external symptoms, and seek help at the terminal stages of the disease. Timely diagnosis and timely initiation of treatment will help to avoid complications that may occur in the later stages of the disease. By providing pharmaceutical information and, counselling services, and pharmacist support, it is possible to reduce the number of patients with complications, thus reducing the cost of their treatment and reducing the number of cases of repeated treatment of patients with VH (retreatment). The analysis of studies conducted in different countries showed that pharmacist support helps a much larger number of patients to complete the full course of treatment without interrupting it and obtain a positive effect, thus reducing the incidence of VH and mortality from its complications.

It should also be noted that the formation of a register of patients with VH during the provision of pharmaceutical care will allow to predict the costs of pharmaceutical support for this category of patients and rationally allocate limited financial resources of the state, taking into account the social status of the patient, the clinical course of the disease and the urgent needs of each individual patient with VH.

Research limitations. However, in order to provide quality pharmaceutical services and appropriate pharmaceutical care, be able to recognize threatening symptoms in a patient who has come to the pharmacy for medicines and refer him or her to a doctor, a pharmacist needs to have an adequate level of knowledge on the diagnosis and treatment of VH. In addition, the implementation of the proposed measures should be of financial interest to both pharmacists and pharmacy owners, as it requires not only the need for specialists to acquire additional knowledge of modern methods of VH diagnosis but also additional.

The effective functioning of the proposed models is impossible without public awareness of the threat of VH and the willingness of high-risk pharmacy visitors to cooperate with pharmacists. It is known that a significant proportion of patients with VH have co-infection with HIV, other types of VH, and other diseases and/or belong to the category of people who inject drugs [5, 6, 16], which causes social danger in case of untimely or incomplete treatment. There is also a certain stigmatized attitude towards patients with VH in society, which, along with a low level of social responsibility of patients, can lead to a negative attitude towards the introduction of an additional pharmaceutical service for the diagnosis of HBV in a pharmacy.

Prospects for further research. We believe it is promising and extremely necessary to develop a broad information campaign focused on the need for VH diagnosis, to study the role of pharmacists in conducting an information campaign and to assess the cost-effectiveness of such measures for the health care system. This should help to increase public awareness and coverage of the population with VH diagnostics, which in turn is expected to lead to timely testing and, as a result, to cost savings in the treatment of patients with complications. It should also be noted that the implementation of the proposed service models requires financial support, for which it is necessary to develop a model of financial support for the implementation of these services at the state level, for example, through the inclusion of pharmaceutical services for VH diagnosis at the pharmacy level in the program of medical guarantees.

6. Conclusions

We believe that pharmacists can play a key role in the treatment of H VH by conducting testing in pharmacies, educating patients on screening methods, and informing them about the importance of timely initiation of pharmacotherapy. Pharmacists can facilitate the implementation of preventive measures and information on risk factors for VH transmission, improve adherence to treatment, assist in monitoring clinical effects and side effects of medications, recommend treatment strategies to minimize side effects and drug interactions and assist in the procurement and logistics of medications, which positively affects patient outcomes and reduces health care costs.

The implementation of the proposed models of information and advisory pharmaceutical services and the model of patient-pharmacist-physician interaction, which will be implemented with appropriate financial support, will result in timely detection of threatening symptoms of a socially dangerous disease and, accordingly, timely diagnosis of potentially affected patients with VH, their visit to a physician and, as a result, prevention of irrational self-medication and promotion of timely initiation of pharmacotherapy in accordance with the needs of each patient with VH.

In our opinion, with the necessary funding, interaction with a pharmacist will allow the patient to receive reliable and substantiated information about medicines and their use, and the pharmacist will monitor the interaction of medicines and support the patient until an effective result of pharmacotherapy is achieved during long-term treatment.

It is assumed that the implementation of the proposed models, with sufficient funding, will have a cumulative positive effect on the healthcare system, such as saving costs for the treatment of patients with VH and for the maintenance of patients with VH complications, which is possible by ensuring timely diagnosis of VH and maintaining an up-to-date register of patients with VH with prioritization of medical and pharmaceutical care.

Conflict of interest

The authors declare that they have no conflict of interest in relation to this research, whether financial, personal, authorship or otherwise, that could affect the research and its results presented in this paper.

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Data availability

Data will be made available on reasonable request.

Use of artificial intelligence

The authors confirm that they did not use artificial intelligence technologies when creating the current work.

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