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MINISTRY OF HEALTH OF UKRAINE
NATIONAL UNIVERSITY OF PHARMACY
Pharmaceutical Faculty
Department of Pharmacology and Clinical Pharmacy

QUALIFICATION WORK

on the topic: **«RESEARCH INTO THE ROLE OF THE PHARMACIST IN ACHIEVING CONTROL OF BRONCHIAL ASTHMA»**

Prepared by: applicant for higher education of group
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ANNOTATION

The qualification work examined the role of the pharmacist in achieving “asthma control”, identified problematic issues that need to be resolved. The compliance of sales at the pharmacy of drugs for the treatment of bronchial asthma with modern guidelines was also studied. The qualification work is presented on 42 pages, includes 1 table, 17 figures, 36 sources of literature and 4 appendices.

Key words: bronchial asthma, pharmacist, control of bronchial asthma, modern guidelines, inhaled corticosteroids.

АННОТАЦІЯ

В кваліфікаційній роботі була вивчена роль фармацевта в досягненні контролю бронхіальної астми, визначені проблемні питання, які потребують вирішення. Також вивчено відповідність продажів в аптеці препаратів для лікування бронхіальної астми сучасним рекомендаціям. Кваліфікаційна робота викладена на 42 сторінках, включає 1 таблиць, 17 малюнків, 36 джерел літератури та 4 додатки.

Ключові слова: бронхіальна астма, фармацевт, контроль бронхіальної астми, сучасні рекомендації, інгаляційні кортикостероїди.

CONTENT

ABBREVIATIONS LIST

BA — bronchial asthma;

BAIs — breath-actuated inhalers;

DPIs — dry powder inhalers;

GINA — Global Initiative for asthma;

ICSs — inhaled corticosteroids;

LABAs — long-acting beta-agonists;

MART — maintenance and reliever therapy;

NAEPP — National Asthma Education and Prevention Program;

NCD — non-communicable disease;

pMDIs — pressurized metered-dose inhalers;

SABAs — short-acting beta-agonists;

SMIs — soft mist inhalers;

SVNs — small-volume nebulizers;

WHO — World Health Organisation.

INTRODUCTION

Relevance of the topic. Bronchial asthma (BA) is a cause of deterioration in the quality of life, serious consequences for the health of citizens of different countries and high mortality in severe cases. BA is ranked 16th among the leading causes of years lived with disability and 28th among the leading causes of burden of disease. About 300 million people in the world suffer from BA, and it is likely that another 100 million may be affected by 2025. Depending on the country, global prevalence ranges from 1% to 18%. But there has been a decrease in the prevalence of asthma between 1990 and 2021. This decrease is due to improved "asthma control".

The main goal of BA pharmacotherapy is to achieve and maintain control of the disease — "asthma control". According to current recommendations, such control can only be achieved by the constant use of inhaled corticosteroids (ICSs) by all asthma patients.

Treatment of patients with mild asthma is primarily carried out by family doctors on an outpatient basis; patients with severe BA are treated by pulmonologists in hospitals. But pharmacists are an important link in the process of "asthma control". Pharmacists, using their knowledge of pharmacology and clinical pharmacology of drugs, as well as through more frequent contact with patients when they receive prescription drugs, can make a useful contribution to achieving effective treatment of asthma.

Pharmacists can also providing the patient with necessary information about asthma medications, teaching the correct inhalation technique for the medication. Pharmacists can also explain to the patient why they need to take their ICSs regularly, clarifying questions about the side effects of ICSs, and recommending measures to ensure adherence to the medication regimen.

However, in practice, pharmacists are not always able to fully implement the proposed measures, so further research is needed to help improve the effectiveness of pharmacists' participation in achieving “asthma control”.

Purpose of the research. The purpose of the master's thesis was to study the role of the pharmacist in achieving control of bronchial asthma.

Research objectives:

1. To conduct a literature review to summarize information on the epidemiology of asthma, current recommendations for asthma pharmacotherapy and the role of the pharmacist in achieving asthma control

2. To develop a questionnaire for surveying pharmacists.

3. To characterize the pharmacists who participated in the survey.

4. To analyze the pharmacists' knowledge of the clinical and pharmacological characteristics of drugs for asthma pharmacotherapy.

5. To analyze the level of pharmacists' awareness of modern guidelines for asthma pharmacotherapy.

6. To analyze compliance the sales of drugs for asthma pharmacotherapy in the pharmacy with current recommendations.

7. To assess the practical implementation of the pharmacist's role in achieving "asthma control".

Object of research. The object of research is bronchial asthma.

Subject of research. The subject of research is the role of the pharmacist in achieving control of bronchial asthma.

Research methods. During the study, methods of data analysis and generalization, the survey method and statistical methods of processing the obtained data were used. The research materials used were sales reports of various pharmacological classes of drugs for the BA pharmacotherapy and questionnaires in the Google Forms, which were answered by pharmacists.

Practical significance of the obtained results. The practical significance of the results of the master's thesis lies in assessing the role of the pharmacist in achieving “asthma control”, in assessing the compliance of sales of drugs for asthma pharmacotherapy with modern guideliness, and in identifying problematic issues that need to be resolved to improve the role of the pharmacist in achieving “asthma control”.

Approbation of research results and publication. The results of the study were published in two abstracts:

1. Analysis of pharmacists' knowledge regarding anti-inflammatory therapy of bronchial asthma / Najla Grine, Nataliia Zhabotynska // Collection of Scientific Papers with the Proceedings of the 1st International Scientific and Practical Conference «Modern Scientific Research: Theoretical and Practical Aspects» (April 14-16, 2025. Riga, Latvia). – European Open Science Space, 2025. –p. 139-140 (Application A).

2. Research into the pharmacist’s role in achieving “asthma control” / Najla Grine, scientific supervisor: Associated Professor Zhabotynska N.V. // Актуальні питання створення нових лікарських засобів: матеріали XXX міжнародної науково-практичної конференції молодих вчених та студентів (23-25 квітня 2025 р., м. Харків). – Харків: НФаУ, 2025. – С. 297-298. (Application C).

Structure and volume of master’s thesis. The master’s thesis consists of an introduction, 3 chapters: literature review, description of research methods, research results and their analysis; conclusions. The master’s thesis is presented on 42 pages, includes 1 table, 17 figures, 36 sources of literature and 4 applications.

CHAPTER 1
LITERATURE REVIEW

1.1. Epidemiology of BA

Bronchial asthma (BA) is a globally significant non-communicable disease (NCD) with major public health consequences, including high morbidity, and mortality in severe cases. The global epidemic of BA that has been observed in both children and adults is still continuing, especially in low to middle income countries, although it has subsided in some developed countries [1]. BA is one of the most common major NCD and for many, has a substantial impact on quality of life. The Global BA Report indicates that the global prevalence of BA is 9.1% among children, 11.0% among adolescents, and 6.6% among adults [2]. BA affected an estimated 262 million people in 2019 [3] and caused 455 000 deaths. Globally, BA is ranked 16th among the leading causes of years lived with disability and 28th among the leading causes of burden of disease. Around 300 million people have BA worldwide, and it is likely that by 2025 a further 100 million may be affected [1, 4].

There is a large geographical variation in BA prevalence, severity, and mortality. Depending on the country, global prevalence ranges from 1% to 18% [5]. In 2021, 204 countries had high annual incidence rates of F, including Poland (1,468 per 100,000), United States of America (10,150 per 100,000), and the United Kingdom (10,030 per 100,000) [6]. In Morocco, between 10% and 20% of the population are involved in BA [7].

In Ukraine, about 200 thousand people suffer from BA [8]. According to official statistics, the prevalence of BA in Ukraine is 0.5% among the adult population [9].

Females have a higher burden of BA than males well into the 5th decade of life. However, the female-male gap in BA burden narrows around the 5th decade. Some even suggest that the sex differential in BA incidence may reverse again,

following a sharp increase in BA incidence in males around the 4th decade of life [1].

The global burden of BA declined from 1990 to 2021. Specifically, the prevalence decreased from 5,568 cases per 100,000 individuals in 1990 to 3,340 cases per 100,000 individuals in 2021[6]. It is important to note that a reduction in the prevalence of current BA is determined by improved BA control and/or reduced BA incidence at a population level [1].

BA is included in the World Health Organisation (WHO) Global Action Plan for the Prevention and Control of NCDs and the United Nations 2030 Agenda for Sustainable Development [10].

1.2. Classification and clinical characteristics of BA

The Global Initiative for asthma (GINA) defines BA as, "a heterogeneous disease, usually characterized by chronic airway inflammation. It is defined by the history of respiratory symptoms such as wheeze, shortness of breath, chest tightness, and cough that vary over time and in intensity, together with variable expiratory airflow limitation [11]."

The current evidence suggests that BA is a complex multifactorial disease and its etiology is increasingly attributed to interactions between genetic susceptibility, host factors, and environmental exposures. These include environmental factors (air pollution, pollens, mold and other aeroallergens, and weather), host factors (obesity, nutritional factors, infections, allergic sensitization), and genetic factors (BA susceptibility loci on genes) [1].

Although underlying mechanisms of BA are not yet fully understood, they may include airway inflammation, control of airway tone and reactivity [1].

The 2020 National Asthma Education and Prevention Program (NAEPP) use the severity of BA classification. This classification includes intermittent asthma, mild persistent asthma, moderate persistent asthma, and severe persistent asthma [12, 13]. The severity of BA is determined by doctors based on the presence and frequency of symptoms such as cough, wheezing, chest tightness or difficulty

breathing, and night-time symptoms. The duration and intensity exacerbations and the duration of remission are also taken into account. An important additional instrumental method of research is the determination of the function of external respiration, in particular the forced expiratory volume in 1 second (FEV1). In BA, this indicator is less than 80% and the degree of its decrease determines the severity of BA.

In contrast, the 2024 GINA guidelines categorize BA severity as mild, moderate, or severe [11]. Severity is assessed retrospectively from the level of treatment required to control symptoms and exacerbations, as follows [13]:

- Mild BA: well-controlled with low-intensity treatment such as as-needed reliever medication alone or with low-intensity controller treatment such as low-dose inhaled corticosteroids (ICSSs).
- Moderate BA: well-controlled with low- or medium-dose ICSS/long-acting beta2-agonists (LABA).
- Severe BA: requires high-dose combination of ICSS/LABA to prevent it from becoming uncontrolled, or asthma that remains uncontrolled despite this treatment.

Therefore, inhaled medication can control BA symptoms and allow people with BA to lead a normal, active life. In BA pharmacotherapy, our focus going forward should be firmly on improving not only short-term symptoms, but also the long-term respiratory and other health outcomes.

1.3. Overview of modern guidelines for BA pharmacotherapy

A lot organization has issued guidelines for the pharmacotherapy of BA, but most important is GINA. GINA was launched in 1993 in collaboration with the National Heart, Lung, and Blood Institute, National Institutes of Health, USA, and the WHO. GINA’s program is determined and its strategies for asthma care are shaped by committees made up of leading asthma experts from around the world. The GINA Scientific Committee prepares updates to guidelines each year, which are made available on the GINA Website as they are completed. The Scientific

Committee has developed a sophisticated set of procedures to review the world's literature with regards to asthma management and to update the GINA documents to reflect this state-of-the-art information [14].

The aim of BA is to gain and maintain control of the disease (defined as "asthma control").

According to the GINA 2024 recommendations, 2 step approaches to BA pharmacotherapy are proposed (Fig 1.1.).

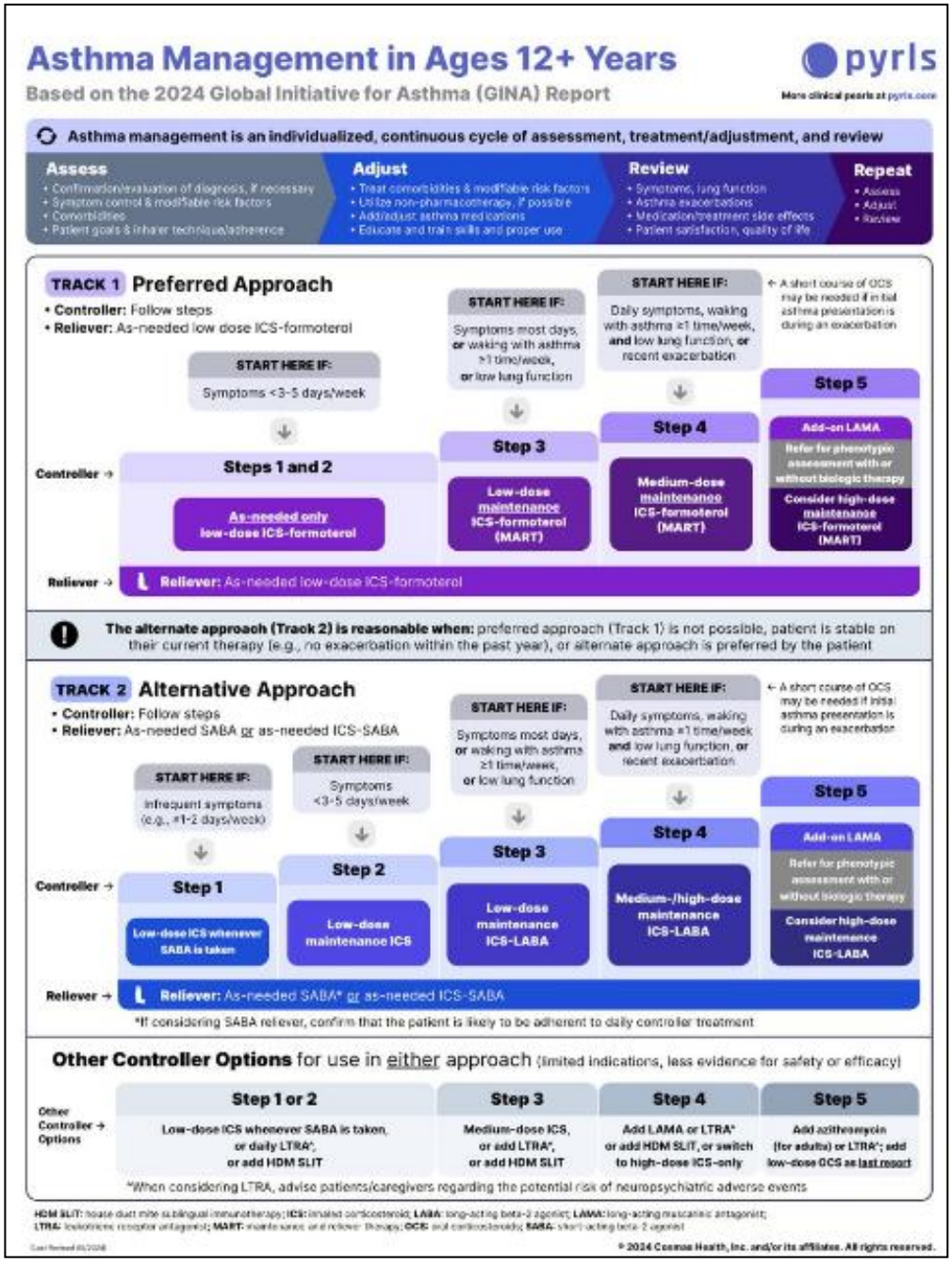


Fig. 1.1. GINA recommended stepwise BA pharmacotherapy (2024) [11, 15]

The recommendations for initial asthma treatment have 2 approaches. These approaches differ in the initial treatment of asthma. 1 preferred approach is maintenance and reliever therapy (MART). This option requires treatment with low doses of ICSS only when patient needed during 1-2 steps. The ICSs of choice is Formoterol. As a 2nd alternative approach initial treatment option, it is preferable for patients with infrequent symptoms to take ICSS when taking SABA rather than daily ICSs plus SABA as needed; this ensures that patients receive at least some of their ICSs. At the 2 step, alternative approach, in constantly low doses of ICSs are recommended. When using MART, at the 3 step, inhalation of combinations of low doses of ICSs and LABA is recommended. At the 4 step, in both approaches, doses of ICSS are increased to medium and combined with LABA. If the treatment of patients at the previous steps is ineffective, for step 5, it is recommended that patients with severe asthma be referred for expert assessment, phenotyping, and add-on treatment [11, 16].

Recommendations include use of relevant ICSs-Formoterol devices (dry-powder inhalers and pressurized metered-dose inhalers) and doses for anti-inflammatory reliever therapy, according to age group and treatment step, as well as the corresponding dosing regimens and maximum number of inhalations to be taken in 1 day [11, 16].

Among other treatment options, also according to GINA 2024, before prescribing the leukotriene receptor antagonist montelukast, physicians should assess the benefits and risks and counsel patients about the risk of neuropsychiatric events [11, 16].

For patients receiving ongoing treatment for severe BA who have had a good response to type 2 target therapy, GINA recommends re-evaluating the need for each asthma medication every 3 to 6 months and emphasizes that the patients should not completely stop their ICSs-containing therapy [11, 16].

Thus, according to the GINA 2024 guideline, to achieve long-term “asthma control”, all patients, regardless of the severity of BA and the step treatment should receive IGCs and not refuse their use even with improved self-being.

In confirmation of this opinion, it is necessary to say that in celebration of World Asthma Day 2025, the GINA has chosen the theme "Make Inhaled Treatments Accessible for All". GINA emphasizes the need to ensure that people with asthma can access inhaled medications that are essential both for controlling the underlying disease and treating attacks. Doctors and allied health care professionals including pharmacist are called upon to ensure that every person with BA is prescribed evidence-based, essential, ICSs-containing medication in addition to (or in combination with) reliever medication, to prevent the continuing avoidable morbidity and mortality from BA [17].

"Asthma control" depends not only on the pharmacological agent but also on the inhaler used for delivering the medication; hence, it is essential to match the right inhaler with the right patient, taking into consideration the needs, abilities, and preferences of each patient [18, 19*]*. The main classes of asthma inhaler devices are small-volume nebulizers (SVNs), pressurized metered-dose inhalers (pMDIs), breath-actuated inhalers (BAIs), dry powder inhalers (DPIs), and soft mist inhalers (SMIs) [18, 20, 21].

Depending on the mechanism employed for storage and dispensation of the drug, DPIs may be categorized as single-unit dose inhalers (each dose is loaded before inhalation), multidose reservoir inhalers (entire supply of drug is preloaded), or multiunit dose inhalers (single doses are individually sealed and released on actuation) [18, 20]. Multidose reservoir DPIs protects the drug formulation from moisture [18, 22].

1.4. The literature review on the role of the pharmacist in achieving "asthma control"

Today, BA pharmacotherapy is carried out by family physicians on an outpatient basis or by pulmonologists in hospitals, where patients with severe BA are admitted. However, pharmacists can also make a useful contribution to achieving "asthma control" due to their knowledge of pharmacology and clinical

pharmacology of drugs and frequent contact with the patient when patients receive prescription medications.

National Governors Association highlights the importance of pharmacists in providing direct health care to patients in an integrated health care system [23].

The main areas of activity of the pharmacist in achieving “asthma control” are presented in Figure 1.2 (Fig.1.2.).

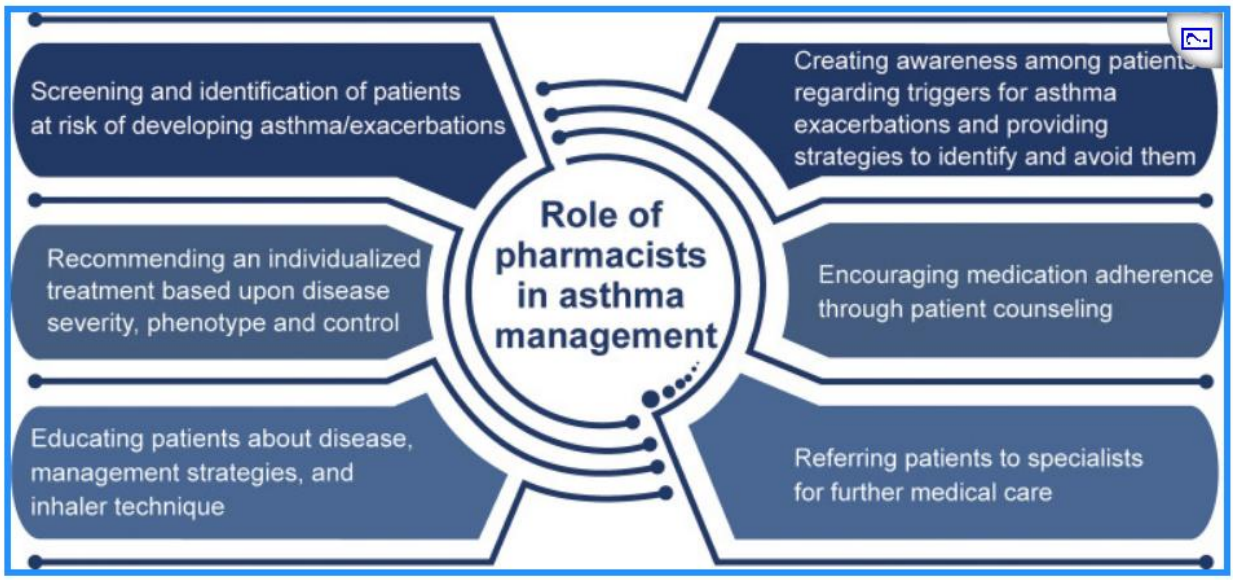


Fig.1.2. Role of pharmacists in BA management [18]

One important strategy for improving “asthma control” is to educate patients on the optimal use of their medications. And pharmacists have a key role to play in this. One important strategy for improving asthma control is to educate patients on the optimal use of their medications. And pharmacists have a key role to play in this. The study E. Mehuys and co-authors showed whether pharmacist interventions, focused on appropriate use of asthma medication and tailor-made to the patient's current asthma control, would improve asthma control in adult patients [24]. A 6-month randomised, controlled, parallel-group trial was conducted in 66 community pharmacies in Belgium. Patients were randomly assigned to receive usual pharmacist care or a pre-defined pharmacist intervention. This intervention mainly focused on improving inhalation technique and medication adherence. A

pre-defined subgroup analysis of patients having insufficiently controlled asthma at baseline showed that the intervention had significantly increased the Asthma Control Test® score after 6 months compared with usual care. The intervention also reduced, for the complete study group, reliever medication use and the frequency of night-time awakenings due to BA. Inhalation technique and adherence to controller medication were significantly better in the intervention group [24].

Pharmacists also play an important role in ensuring that patients have a BA action plan to follow. Written action plans, which can assist with the detection and early treatment of exacerbations, are an important part of self-management [20]. BA action plans provide information on medications and their dosage, how to recognize symptom worsening, and steps to be followed in the case of an emergency [18, 25]. These individualized written action plans (ie, information on when and how to increase the dose, duration of reliever medication treatment, and when to seek medical help) along with information on the increased dosing of ICSs have been shown to improve asthma outcomes. These individualized plans should be completed by HCPs to maximize adherence and minimize errors [18, 25].

Effective communication between the patient and pharmacist can help achieve patient adherence to maintenance ICSs medications and prevent adverse events and mortality associated with bronchodilator overuse in the absence of ICSS [18].

Educating patients about mechanisms of action, adverse drug reactions, and counselling on medication regimens are the most common tasks pharmacists perform. Given this, it is important that pharmacists focus on improving patients' understanding not only of the causes and symptoms of BA and inhaler technique, but also of treatment regimens and the importance of adherence [26]. Medication adherence is a multi-phased process including initiation of prescribed therapy, implementation of therapy as prescribed, and subsequent persistence of the treatment regimen [18, 27]. A study Gamble J. and co-authors has shown that

healthcare provider interventions improve asthma treatment adherence, along with reduced controller medication doses and hospitalizations [18].

An online survey of pharmacists was conducted from December 2022 through March 2023 in Jordan to investigate the knowledge, attitudes, and practices of BA counselling and the barriers perceived by community pharmacists. The study involved 416 community pharmacists who responded to a 5-part questionnaire. These parts assessed socio-demographic and medical references used to search for drug-related information, pharmacists' knowledge, attitudes, practices, and barriers to providing asthma counselling. The findings of the study may inform future strategies to enhance the role of pharmacists in BA pharmaceutical care [28].

In 2024, Aseel M. and co-authors conducted a literature review examining the role of pharmacists in the Gulf Cooperation Council (United Arab Emirates, Qatar, Kuwait, Oman, Saudi Arabia, and Bahrain) in the care of adult patients with BA. The findings suggest a need to improve pharmacists' knowledge of demonstrating inhaler technique (mainly metered dose inhalers), advising on BA management, and assessing "asthma control" and medication use. The review also highlights the lack of research on pharmacist-led asthma interventions and identifies training needs for pharmacists to participate in BA care [29].

Conclusions to Chapter 1

BA is a globally significant NCD with major public health consequences, including high morbidity, and mortality in severe cases. BA is one of the most common major NCD and for many, has a substantial impact on quality of life.

The aim of BA treatment is to gain and maintain control of the disease (defined as "asthma control"). According to the GINA 2024 recommendations, to achieve long-term "asthma control", all patients, regardless of the severity of BA and the step treatment should receive IGCs and not refuse their use even with improved self-being.

Pharmacists can play a leading role in helping asthma patients and their physicians achieve and maintain “asthma control” by providing the patient with necessary information about asthma medications, teaching the correct inhalation technique for the medication. Pharmacists can also explain to the patient why they need to take their ICSs regularly, clarifying questions about the side effects of ICSs, and recommending measures to ensure adherence to the medication regimen.

However, in practice, pharmacists are not always able to fully implement the proposed measures, so further research is needed to help improve the effectiveness of pharmacists' participation in achieving “asthma control”.

CHAPTER 2
RESEARCH METHODS

The master's thesis was carried out in two stages: theoretical and practical. At the first, theoretical, stage, a review of 36 sources of literature was conducted. The purpose of the review was to summarize information on epidemiology, classification, clinical features, modern approaches to BA pharmacotherapy, as well as to study the results of studies on the role of pharmacists in different countries in achieving "asthma control". The literature review allowed us to formulate the tasks that need to be solved in the research process.

The practical stage of the study was conducted in a Pharmacy al Ghaith belfaa Agadir Morocco and consisted of two parts. First, an analysis was conducted of the range of drugs for the BA treatment available in the pharmacy and their compliance with modern BA treatment guidelines. Secondly, the sales volumes of drugs of different pharmacological classes for the pharmacotherapy of asthma were studied. The sales analysis was conducted over three months (from June to September 2024).

Then, a survey was conducted of working pharmacists of the pharmacy and pharmacy students. By answering the questionnaire, all pharmacists agreed to participate in the study.

The electronic version of the questionnaire in the form of Google Forms was chosen for the survey. Google Forms is an online service for creating tests, surveys, event registration forms, and collecting feedback. All information filled in by respondents can be automatically converted into a table. Thanks to this Google Forms feature, the responses received can be quickly analyzed [30].

Several advantages of Google Forms questionnaires can be highlighted [31]:

1. There is no need to repeat the survey material for all respondents.
2. Communication with respondents is implemented without the need to meet them in person, gathering them all together at the same time and in the same place.

3. Survey results are stored on the Internet and are constantly available.

4. Google Forms is a free tool for creating and sending surveys.

5. The questionnaire can be uploaded to a website or blog to provide a secure way to collect data from website visitors.

6. Survey results are automatically processed and presented in the form of graphs and charts.

To perform the practical part of the master's thesis, a questionnaire in the form of Google forms was developed, consisting of 4 parts and 22 questions.

The first part is general information (age, gender), information on education, employment and interest in receiving new pharmaceutical information:

1. Please indicate your age.

2. Please indicate your gender.

3. Are you a student or have you already graduated from the University? If you have graduated, please indicate the year.

4. Do you work in a pharmacy.

5. Are you interested in current information about new medicines or methods of treating various diseases? Please select what sources of information do you use?

The second part of questions was devoted to determining the level of general knowledge of pharmacists about pharmacological classes of drugs for the BA treatment, their side effects and methods of application:

1. Choose the pharmacological class of drugs used for on an as-needed basis relief of asthma attacks.

2. Choose the pharmacological class of drugs used to achieve long-term control of BA.

3. Choose the pharmacological class of drugs that affects the inflammatory process in the bronchi in BA.

4. Choose the route of administration of corticosteroids in BA patients.

5. Choose which of the following doses of ICS are low, medium, and high for Beclomethasone, Budesonide, Fluticasone.

6. Indicate possible side effects when using ICSs.

The third part of questions determined the knowledge of pharmacists about modern guidelines for BA pharmacotherapy.

1. What is the Guideline for BA pharmacotherapy?
2. How many steps do stepwise approach to BA pharmacotherapy?
3. What pharmacological class of drugs should all patients with BA receive?
4. What pharmacological classes of drugs are included in combined inhalation drugs for BA pharmacotherapy?
5. Which drug from the LABA is recommended by the GINA 2024 as the drug of choice for the BA pharmacotherapy?

The fourth part of questions was assigned to respondents who work in pharmacies. In this block, the questions were formulated in such a way as to determine the practical implementation of the pharmacist's role in achieving “asthma control”.

1. Do you explain to patients the technique of using an inhaler on your own initiative?
2. How often are you asked to explain how to use an inhaler?
3. Which inhalers devices should be recommended to patients with BA according to current recommendations for asthma pharmacotherapy?
4. Do you ask patients who only purchase a LABA or SABA whether they have an ICS? If they don't have them, do you explain why they need them?
5. Do you explain to patients the need to take an ICS continuously?
6. Do you explain to patients methods to prevent side effects of ICS?

To analyze the data obtained, the results of automatic processing of Google Forms were used, as well as the programs MS Excel for Windows XP, SPSS 10.0.5 for Windows Microsoft Office were used. Statistical characteristics of variables were presented using percentage ratios and Fisher's exact test arithmetic means (M) ± standard deviations (SD). Fisher's exact test (also Fisher-Irwin test) is a statistical significance test used in the analysis of contingency tables. It can be

used for small sample sizes. It belongs to the class of exact statistical methods because it allows for the significance of deviations from the null hypothesis (e.g., p – values) [32]. To calculate Fisher's exact test, an online calculator is used. (https://www.omnicalculator.com/statistics/fishers-exact-test). The results of all statistical procedures were considered significant at $p<0.05$.

Conclusions to Chapter 2

During the study, methods of data analysis and generalization, the survey method and statistical methods of processing the obtained data were used. The research materials used were sales reports of various pharmacological classes of drugs for the BA pharmacotherapy and questionnaires in the Google Forms, which were answered by pharmacists.

CHAPTER 3
THE RESULTS OF THE RESEARCH. THE DISCUSSION OF THE RESULTS

3.1. General characteristics of pharmacists participated in the survey

The survey was attended by 29 pharmacists aged 21 to 41 years, with an average age of 22.85±4.76 years.

The distribution of survey participants by gender is presented in Fig. 3.1.: 10 female (34,48%) and 19 male (65,52%).

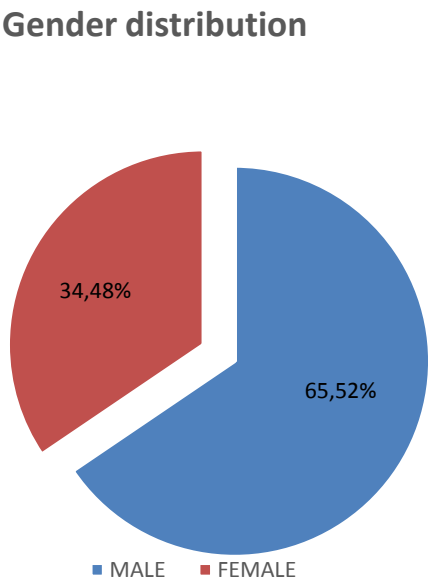


Fig. 3.1. Distribution of pharmacists by gender

The survey was attended by 25 5th year students of the National University of Pharmacy studying in English and 4 pharmacists who have already completed their education. Among the survey participants who have already completed their education, the distribution by University graduation dates was as follows: 2017 to 2022 (1-5 years later) — 2 pharmacists (6.9% of applicants) and 2007 to 2017 (10 years later) — 1 pharmacist (3.45% of applicants).

Given that the master's thesis is devoted to the role of the pharmacist in achieving asthma control, the next question of the questionnaire concerned the

employment of respondents. Among the respondents, 12 (41,38%) are full-time pharmacist, 5 (17,24%) have experience working in a pharmacy, but aren't currently working, 12 (41,38%) don't work at all (Fig. 3.2.). It is noteworthy that of the full-time pharmacists, 7 (58,33%) are 5th year students of the National University of Pharmacy.

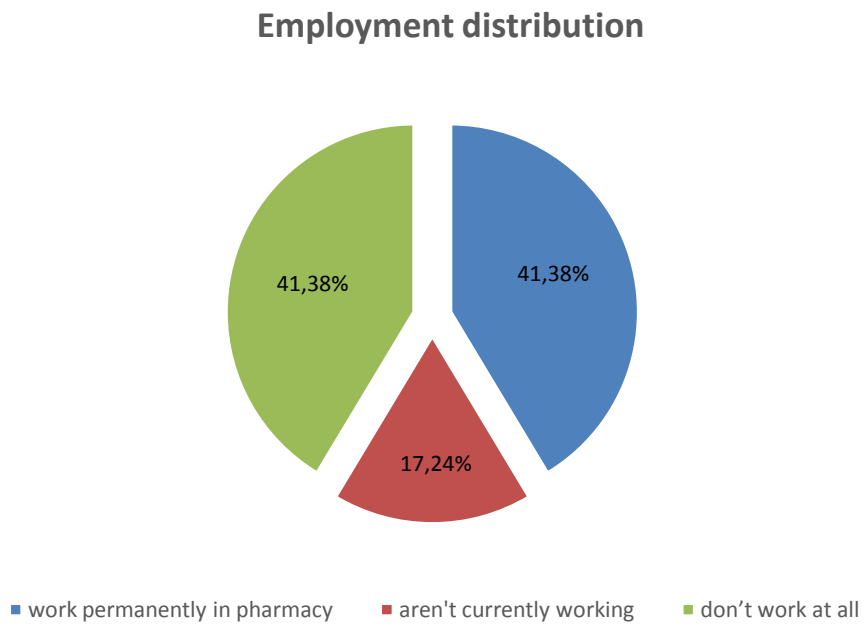


Fig. 3.2. Distribution of respondents by employment

19 (65,52%) pharmacists responded positively to the question about their interest in receiving new pharmaceutical information. Among the sources of information, 4 (21,05%) pharmacists indicated articles in scientific journals, 6 (31,58%) — information from the Internet, 5 (26,32%) — Guidelines, and 4 (21,05%) pharmacists indicated recommendations from colleagues. Unfortunately, only a little more than 47% of pharmacists (including all full-time pharmacists) read scientific articles and modern guidelines, that is, receive information with an evidence base. Unfortunately, only a little more than 47% of pharmacists (including all full-time pharmacists) read scientific articles and modern guidelines, that is, receive information with an evidence base. Thus, about 53% of respondents

do not pay sufficient attention to improving their knowledge of pharmacology, pharmacotherapy, and clinical pharmacy.

Thus, among the surveyed pharmacists, the majority was male of 5th year of study working in a pharmacy or have experience working in a pharmacy and prefer to obtain new pharmaceutical information from the Internet sources or from the colleagues-pharmacists.

3.2 Analysis of pharmacists' knowledge regarding the clinical and pharmacological characteristics of drugs for BA pharmacotherapy

One of the areas of work of a pharmacist is informing BA patients about the mechanisms of action of the pharmacological classes of drugs that they should take to treat the disease, about their possible side effects and effective methods of application.

When choosing pharmacological classes of drugs for on an as-needed basis relief of asthma attacks, the majority of pharmacists — 23 (79.32%) — chose SABA (Fig.3.3.).

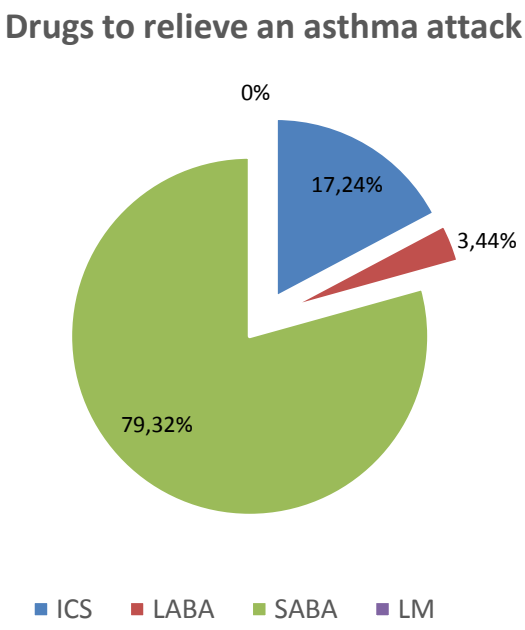


Fig. 3.3. Selection of pharmacological class of drugs for on an as-needed basis to relieve an asthma attack

The mechanism of action SABA involves bronchodilation through adrenergic stimulation via the beta-2 receptors on airway smooth muscle cells. The hallmark SABA is the drug Salbutamol, which has an onset of action of less than 5 minutes and therapeutic effect duration between 3 to 6 hours [33]. More than 17% of pharmacists believe that ICSs can have a quick effect and relieve a BA attack, although it does not correspond to the mechanism of action of IGSs. 1 pharmacist believes that asthma attacks can be stopped with LABA. Among those who gave incorrect answers, only unemployed students were included.

When choosing drugs to achieve long-term “asthma control” symptoms, the majority of pharmacists 23 (71.76%) correctly chose ICSs (Fig.3.4). It is ICSs that allow to provide long-term “asthma control” due to their mechanism of action. ICSs suppress inflammation mainly by switching off multiple activated inflammatory genes. ICS enhance the beta-adrenergic response to relieve the muscle spasm. They also act by reversing the mucosal oedema, decreasing vascular permeability by vasoconstriction. ICSs work directly at the cellular level by reversing capillary permeability and lysosomal stabilization to reduce inflammation. The onset of action is gradual and may take anywhere from several days to several weeks for maximal benefit with consistent use. Metabolism is through the hepatic route, with a half-life elimination of up to 24 hours [34]. 5 (17,24%) pharmacists believe that long-term “asthma control” can be achieved by using LABA. But this is not entirely correct. LABA can reduce bronchospasm for a long time (compared to the SABAs, with up to 15 minutes for Salmeterol and a duration of effect of at least 12 hours) [33], but at the same time don’t affect the inflammatory process in the bronchi, which is the main cause of the development of BA. LABAs are generally added as second-line treatment in asthma that has failed symptomatic relief with SABAs and ICSs. 3 (10%) pharmacists believe that long-term “asthma control” can be achieved by using LM. LM blocks CysLT1 receptors, which are bound by cysteinyl leukotrienes (LTC4, LTD4, and LTE4) and cause bronchoconstriction, increased vascular permeability, eosinophil

recruitment, and chronic inflammation [35]. However, their efficacy is significantly inferior to ICS.

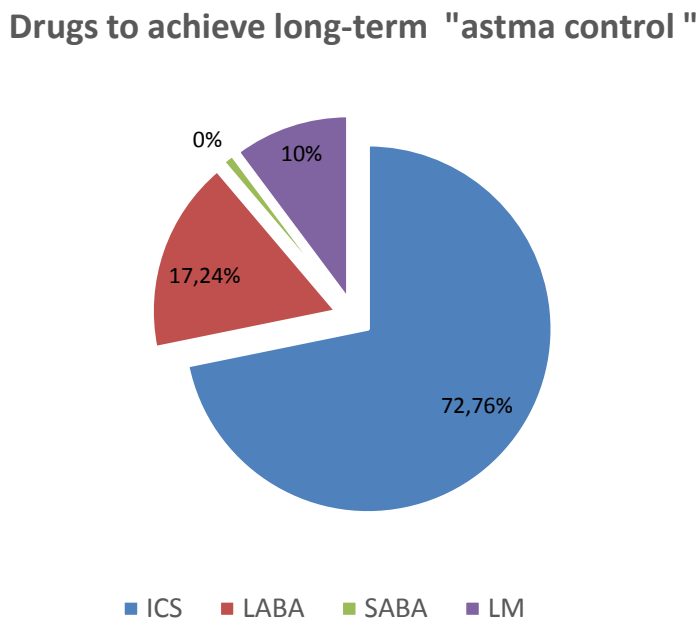


Fig. 3.4. Selection of pharmacological class of drugs to achieve long-term “asthma control”

To clarify pharmacists' understanding of the anti-inflammatory properties of drugs for the treatment of asthma, a question was asked about the choice of drugs that affect the inflammatory process in the bronchi. The distribution of answers was similar to the previous question. 25 (86,2%) pharmacists chose ICSs, 4 (13,79%) pharmacists chose LM. No pharmacist chose SABA and LABA (Fig.3.5.). That is, the vast majority of pharmacists (from nearly 72% to 86%) understand that it is ICSs that have the greatest anti-inflammatory effect on the bronchi and allow for long-term “asthma control”.

When asked about the route of administration of ICSs, all 100% of pharmacists chose the answer "inhalation". ICSs are administered through the inhalation route directly to their sites of action. This mode of administration decreases the dose required for the desired effect as it bypasses the first-pass metabolism in drugs taken orally. The reduced systemic bioavailability also minimizes side effects [34].

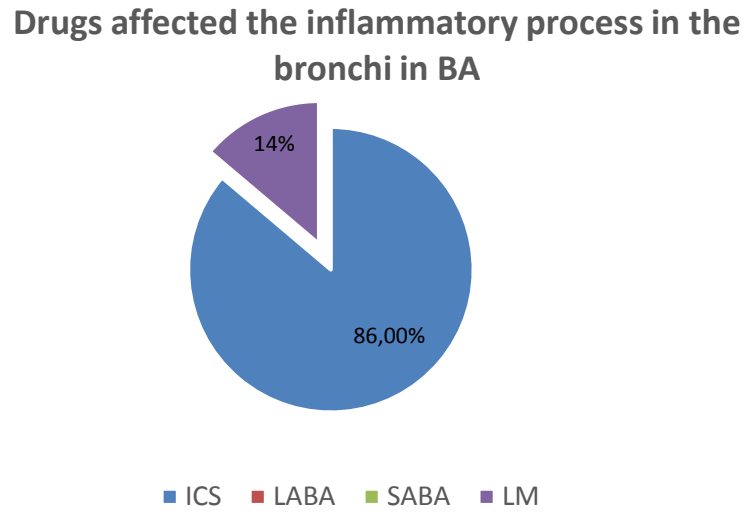


Fig. 3.5. Selection of pharmacological class of drugs affected the inflammatory process in the bronchi in BA

The stepwise approach to BA pharmacotherapy involves a gradual increase in the dose of ICS: in steps 1-2, low doses of ICSs are used; in steps 3, medium doses in combination with LABA, and in steps 4-5, high doses of ICSs are combined with LABA. Therefore, it is important for pharmacists to understand the correct dosages of ICSs and to explain these issues to patients with BA. The literature provides a classification of dosages depending on the specific drug and the type of inhaler used to deliver ICS to the bronchi. The 3 most common ICSs were selected for the survey: Beclomethasone, Budesonide, Fluticasone. The distribution of correct answers by pharmacists is given in the table (Table 3.1).

Table 3.1

Distribution of pharmacists' knowledge about ICS doses

	Low-dose	Medium-dose	High-dose
Beclomethasone	20 (68,96%)	22(75,86%)	21 (72,41%)
Budesonide	22(75,86%)	19 (65,52%)*	20 (68,96%)
Fluticasone	24 (82,76%)	25 (86,20%)*	23 (79,31%)

*p≤0,05 significance of difference in answers

The results of the survey showed that more than 65% of pharmacists are correctly oriented in choosing ICSs dosages. A significant ($p \leq 0,05$) difference in the responses was established only between the choice of medium doses for Budesonide and Fluticasone. At the same time, 100% of pharmacists who work full-time or have experience working in a pharmacy gave correct answers. Thus, the practical activity of a pharmacist contributes to increasing his knowledge about the peculiarities of dosages of medicinal products, in particular ICSs.

Another important area of pharmacist work is informing patients about possible side effects of drugs and explaining ways to prevent these effects. Many patients with BA are afraid to use ICSs because of the possible development of side effects. Therefore, clarifying pharmacists' knowledge about the side effects of ICSs is an important element of their participation in achieving “asthma control”.

Analyzing pharmacists' responses to side effects of ICSs, it was found that from 24% to nearly 38% of ICSs have such systemic side effects as arterial hypertension, hyperglycemia and obesity (Fig.3.6.).

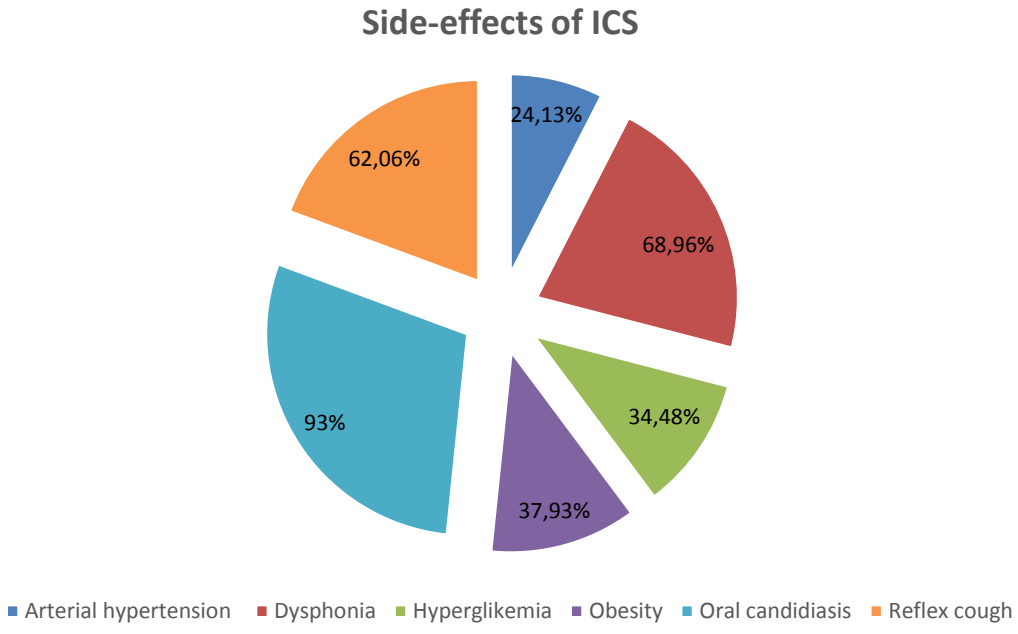


Fig.3.6. Analysis of pharmacists' knowledge about side effects of ICSs

The development of systemic side effects is possible only with prolonged use of high doses of ICSs, which is quite rare in BA. Other potential systemic

adverse effects of ICSs are rare and/or clinically insignificant, including cataracts, glaucoma, hypothalamic-pituitary-adrenal axis dysfunction, and impaired glucose metabolism [34]. From 62% to 93% of pharmacists are correctly oriented in possible local side effects such as dysphonia, oral candidiasis, and reflex cough. Local adverse effects of ICSs are less common with low-dose ICSs than with high-dose ICSs. These adverse effects are also mitigated by spacer use when taking the medication via metered-dose inhalers [34]. 93% of pharmacists point to the possible development of oral candidiasis is another common complaint among users of ICSs. It is noteworthy that, as in previous answers about the dosage of ICSs, 100% of full-time pharmacists and those who had experience working in pharmacies answered the question about the side effects of ICSs correctly.

3.3. Analysis level of general knowledge of pharmacists about modern recommendations for BA pharmacotherapy

Pharmacotherapy of any kind is developed based on evidence-based medicine (EBM). EBM uses the scientific method to organize and apply current data to improve healthcare decisions. Thus, the best available science is combined with the healthcare professional's clinical experience and the patient's values to arrive at the best medical decision for the patient [36]. Therefore, it is very important for pharmacists to know current guidelines, which they can use to improve their knowledge and apply them to achieve “asthma control”. When asked which guideline should be used for BA pharmacotherapy, 25 (62,54%) pharmacists chose the guideline GINA 2024 (Fig.3.7). It is important to know that the GINA is updated annually and the latest protocol for today should be used — GINA 2024. Almost 24% of pharmacists chose the GOLD guideline, which regulates the pharmacotherapy of chronic obstructive pulmonary disease, not BA. 3 (10,34%) pharmacists chose the American Heart Association guideline, which regulates the pharmacotherapy of cardiovascular diseases.

To understand the level of knowledge about modern approaches to BA pharmacotherapy, pharmacists were asked several questions about the peculiarities

of the organization and selection of pharmacological classes for the treatment of BA.

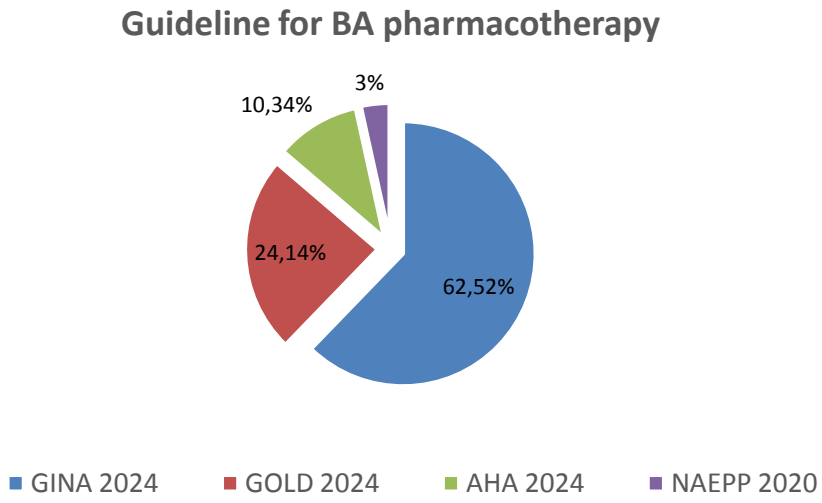


Fig.3.7. Pharmacists' choice of Guideline for BA pharmacotherapy

When asked how many steps are there in the step therapy of BA 8 (24,13%) pharmacists answered that there are 2. In our opinion, this answer is due to the fact that pharmacists confused the concepts of steps and approaches to BA pharmacotherapy (steps — 5, and approaches — 2). But a little more than half of the pharmacists — 58,62% — answered correctly. 5 (17,25%) of pharmacists are not at all familiar with the stepwise approach to BA pharmacotherapy (Fig.3.8.).

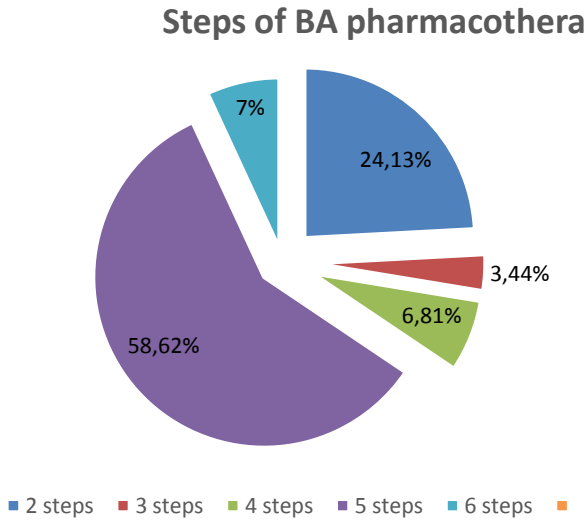


Fig.3.8. Analysis of pharmacists' knowledge about stepwise approach to BA pharmacotherapy

These results indicate an insufficient level of knowledge among pharmacists of modern BA treatment guidelines.

When asked about the mandatory pharmacological class should all patients with BA receive, almost 70% answered ICSs, and 17.24% chose SABA (Fig.3.9). In our opinion, the choice of SABA by pharmacists is due to the fact that these drugs are used to relieve asthma attacks (achieve a short-term effect) in all patients, but it is precisely ICS that are needed to achieve a long-term “asthma control” in the treatment of BA. The number of pharmacists who choose ICSs for all patients with BA isn’t significant different from the number of pharmacists who are aware of the anti-inflammatory properties of ICSs in BA. Unfortunately, almost 14% of pharmacists aren’t guided in the correct choice of pharmacological class of drugs for all patients with BA. This result indicates the need to improve pharmacists' knowledge of modern approaches to BA pharmacotherapy. Among such pharmacists there was not a single permanently employed pharmacist. Most 14% of pharmacists are not familiar with the correct choice of pharmacological group of drugs for long-term “asthma control” in all patients with BA.

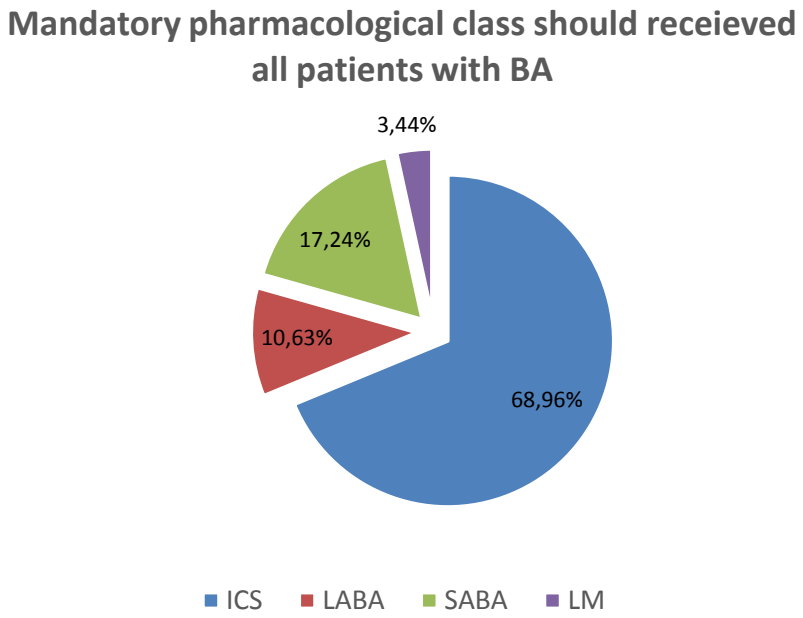


Fig.3.9. Analysis of pharmacists' knowledge about mandatory pharmacological class should received all patients with BA

When asked which groups of drugs are recommended for combination inhalation therapy of BA the vast majority of 25 pharmacists — 86,20% — chose the correct answer IGSs + LABA. No pharmacist chose the combination ICSs+ LM because the question was specifically about the inhalation use of drugs (Fig.3.10.). It is also important for pharmacists to understand that the implementation of combination therapy should be carried out using a fixed-dose combination in a single inhalation device. This approach to BA pharmacotherapy can bring benefits by reducing critical errors in inhaler management, improving adherence to treatment and reducing costs, while maintaining the same clinical effectiveness. All of these benefits should be explained by pharmacists to patients when choosing drugs for combination inhalation therapy of BA. GINA 2024 emphasizes the need to counsel patients about the potential risk of neuropsychiatric adverse events associated with taking LM [11]. Only 5 (13,68%) pharmacists aren't sufficiently knowledgeable in choosing drugs for combined inhalation therapy, and there are no full-time working pharmacists among them.

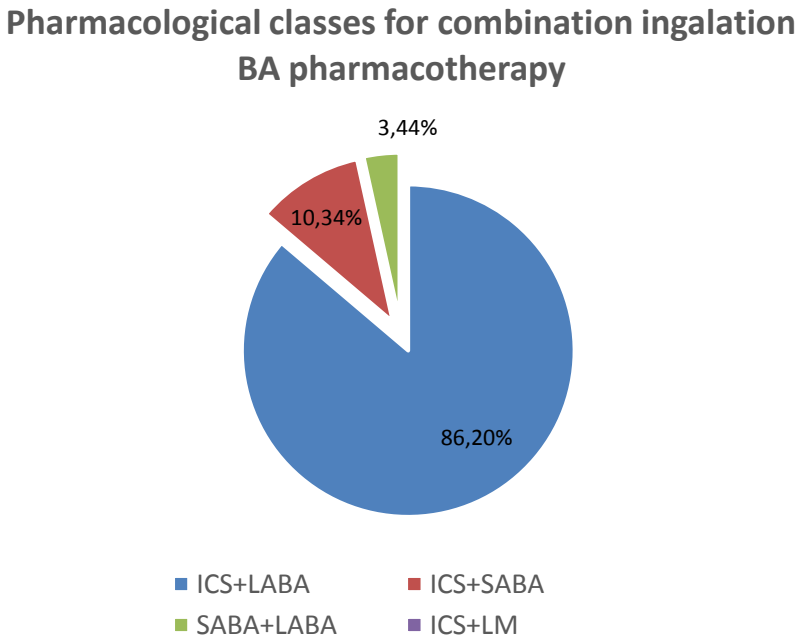


Fig.3.10. Analysis of pharmacists' knowledge about pharmacological classes of drugs is included in combined inhalation drugs for BA pharmacotherapy

The GINA 2024 guideline emphasize that the drug of choice from the LABA for combination inhalation therapy is Formoterol. This recommendation is based on the availability of data from randomized controlled trials and meta-analyses on the long-term safety and efficacy of the combination of Beclomethasone (ICSs) and Formoterol (LABA). There is currently no evidence for the safe and effective use of the combination of ICSs with Salmeterol (LABA). Indacaterol and Vilanterol are recommended for patients who have had a history of asthma exacerbations in the previous year [11]. In this regard, it is important that pharmacists recommend to patients the choice of combination inhaled medications based on Formoterol. Among the pharmacists surveyed, 17 (58,62%) chose Formoterol and 10 (34,5%) Salmeterol as their drug of choice (Fig.3.11.). Among the pharmacists who gave the correct answers were all full-time working pharmacists and 3 students who had experience working in a pharmacy, and 2 students who were completing their studies.

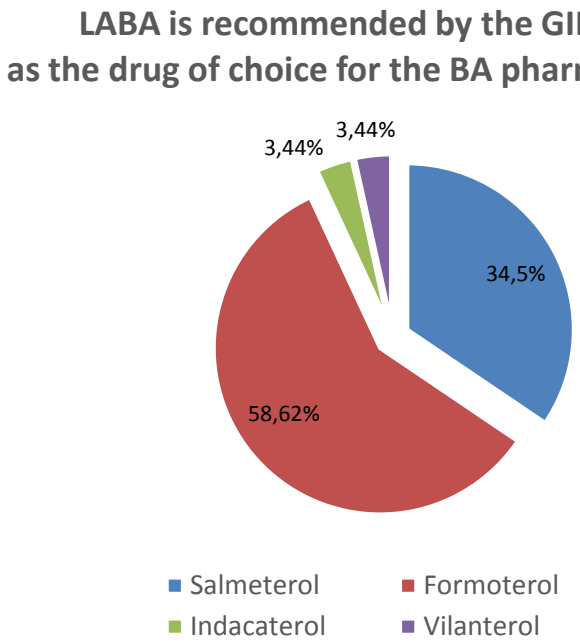


Fig.3.11. Analysis of pharmacists' knowledge about which drug from the LABA is recommended by the GINA 2024 as the drug of choice for the BA pharmacotherapy

Summarizing the results of the analysis of pharmacists' knowledge of modern recommendations for BA pharmacotherapy, we can say that only slightly more than 60% of pharmacists know which guidelines regulate BA treatment and how many steps the stepwise approach to BA treatment has. Almost 70% understand that all patients with BA should receive ICSs and more than 85% know that starting from step 3 they should be combined with LABA. However, only about 60% know that Formoterol should be used for this. It is noteworthy that pharmacists who work full-time are almost 100% correctly oriented in modern recommendations for BA pharmacotherapy.

3.4. Assessment of the practical implementation of the pharmacist's role in achieving "asthma control"

The literature describes in sufficient detail the areas of activity of pharmacists that contribute to achieving “asthma control”. But it is important to know to what extent pharmacists realize their capabilities during their practical activities in the pharmacy. To study this aspect, only full-time pharmacists answered the last part of the questionnaire, devoted to the practical implementation of the pharmacist's role in achieving "asthma control".

The GINA 2024 recommendations pay special attention to teaching patients the correct technique for using inhaled medications. Patient education is one of the important areas of pharmacists' work. Only 5 (48%) working pharmacists on their own initiative teach patients how to use an inhaler. But this indicator isn’t significant according to Fisher's exact test ($\varphi emp. = 0.82$; $p = 0.206$). At the same time, 11 (91,66%) pharmacists respond to patients' requests, which is a significant majority ($\varphi emp. = 4.826$; $p \leq 0,05$) (Fig.3.12.). In our opinion, the pharmacist's routine workload limits his ability to provide patient education on his own initiative. Perhaps consideration should be given to assigning such authority to a specific pharmacist who has the best knowledge on this issue.

A very important issue is the choice of inhalation device, with which the inhaled drug will be delivered to the lungs. When asked about the recommended

type of inhalation device, 7 (58,33%) pharmacists answered that they choose it according to the drug prescribed to the patient with BA. 3 (25%) answered that they do not pay attention to this. 2 (16,66%) chose dry powder inhalers (DPIs) which is in the GINA 2024 guidelines. The number of pharmacists who don't pay due attention to the choice of inhalation device is significantly higher ($\varphi_{емп.}$ = 1.693; p = 0.0453). Thus, pharmacists do not pay enough attention to the importance of choosing an inhalation device for a specific patient to deliver the drug to the lungs.

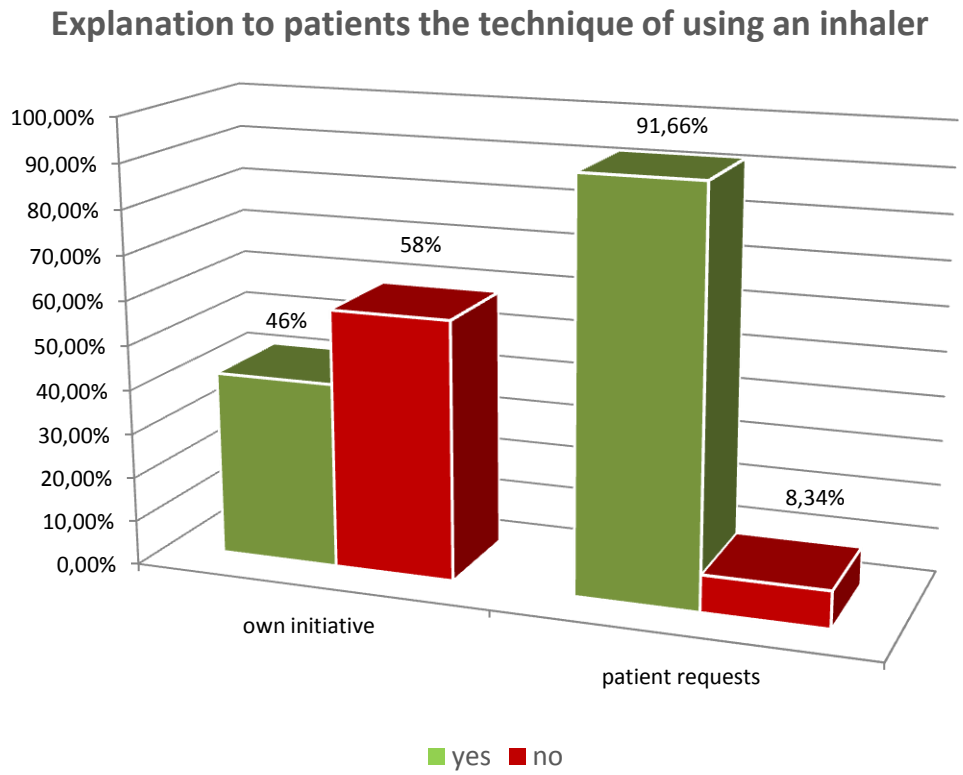


Fig.3.12. Educating patients on the correct use of inhalers by pharmacists

The survey results showed that 8 (66,66%) pharmacists ask patients who buy LABA or SABA whether they have ICS. However, only 6 (50%) explain the need for ICSs treatment and recommend purchasing ICSs to patients with BA. The number of pharmacists who ask patients about their ICSs is significantly higher than those who do not ($\varphi_{емп.}$ = 1.665; p = 0.048). However, no significant

difference was found between the number of pharmacists who counsel patients about the need to use ICSs.

When asked whether they explain to patients the need for continuous ICS use, 8 (66,66%) pharmacists (a significantly majority — $\varphi_{емп.} = 1.665$; $p = 0.048$) answered "yes" provided that patients ask about the duration of ICSs use.

We obtained similar results in response to the question of whether pharmacists explain methods to prevent side effects of ICSs: 8 (66,66%) pharmacists advise patients on this issue, which is a significantly majority — $\varphi_{емп.} = 1.665$; $p = 0.048$.

Evaluating the practical implementation of the pharmacist's role in achieving “asthma control”, it was found that pharmacists don’t pay enough attention to teaching patients how to use inhalation devices on their own initiative and do not pay due attention to the choice of inhalation device. At the same time, the significantly ($p \leq 0,05$) majority of full-time pharmacists are interested in whether patients have ICSs, explain the need for continuous long-term use of ICSs, and advise on the prevention of side effects from ICSs use.

3.5. Analysis of sales of drugs for the BA pharmacotherapy

An analysis of sales of drugs for the BA pharmacotherapy was conducted over three months (from July to September 2024) in a Pharmacy al Ghaith belfaa Agadir Morocco. During this time, 413 packages of drugs for the BA treatment were sold. The analysis was conducted according to the following pharmacological classes recommended by GINA 2024: ICSs, SABA, LABA and LM. Almost 68% of sales were SABAs, while ICSs sales were only about 21%. Sales volumes of LAVA were even smaller – 9% (Fig.3.13.).

Next, an analysis of sales was conducted for separate drugs from different pharmacological classes (Fig.3.14.). Among ICSs, Fluticasone sales were significantly higher compared to both Beclomethasone ($\varphi_{емп.} = 8.211$; $p \leq 0,01$) and Budesonide ($\varphi_{емп.} = 7.504$; $p \leq 0,01$). Among LABA, Salmeterol e sales were significantly higher compared to Formoterol ($\varphi_{емп.} = 2.244$; $p=0,0124$). There was

no significant difference between LM sales, although Montelukast was sold more quantitatively. An analysis of LAVA sales demonstrated that a drug whose effectiveness doesn't have a sufficient evidence base is likely to be sold more.

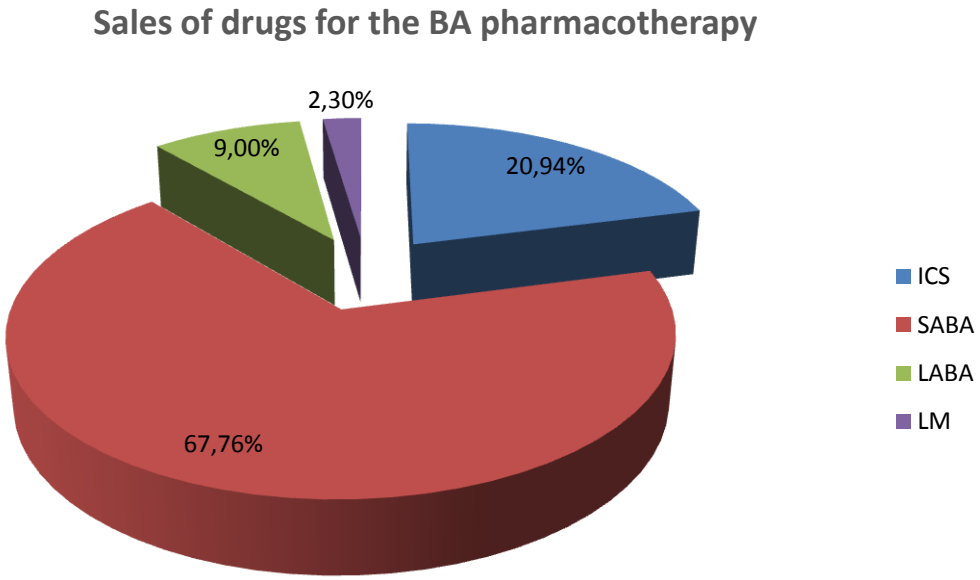


Fig.3.13. An analysis of sales of different pharmacological classes of drugs for the BA pharmacotherapy

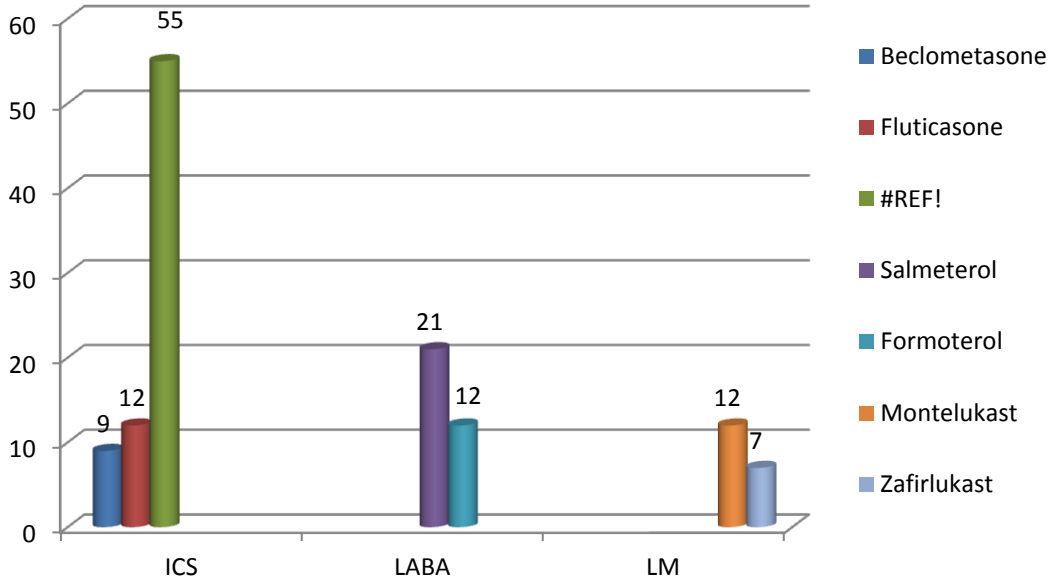
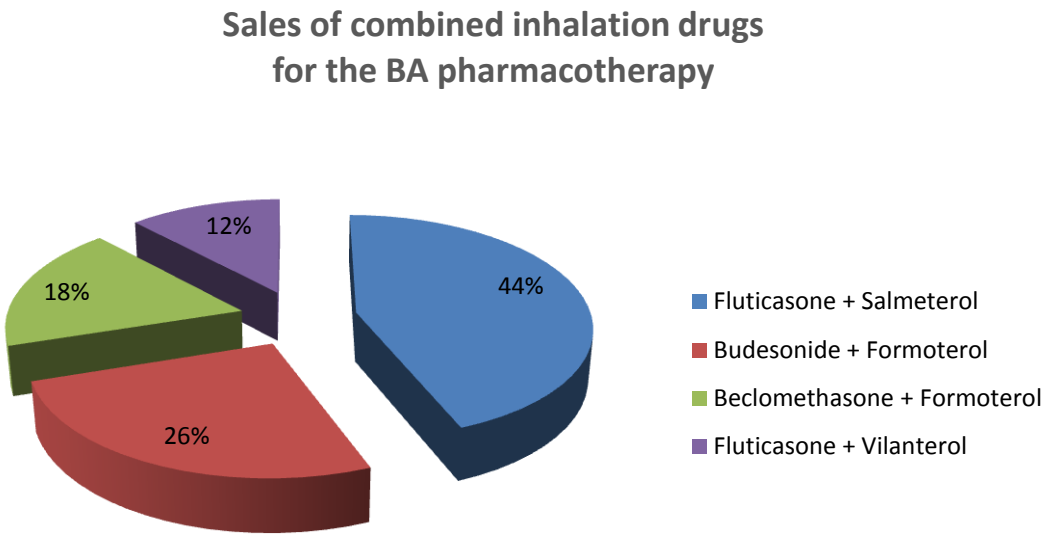


Fig.3.14. An analysis of sales was conducted for separate drugs for BA pharmacotherapy from different pharmacological classes

Considering the results of a survey of pharmacists, which showed that only about 59% know that Formoterol is the recommended drug of choice, it becomes clear that there is an urgent need to improve the role of the pharmacist in achieving "asthma control".

Next, an analysis of sales of combined inhalation drugs for the BA treatment was conducted (Fig.3.15.).



3.15. An analysis of sales of combined inhalation drugs for the BA pharmacotherapy

Analyzing the sales of combined inhaled drugs consisting of ICSs and LAVA, it was found that the combination of Fluticasone + Salmeterol was significantly more sold than the combinations of Formoterol with Budesonide ($\varphi_{емп.}$ = 1.902; p=0,0286) and Formoterol with Beclomethasone ($\varphi_{емп.}$ = 2.871; p=0,002). However, if we compare the total sales of combined drugs containing ICSs and Salmeterol or Fromoterol, no significant difference was found, they were the same.

Analysis of sales of drugs for the BA treatment of asthma showed a significant predominance of sales of SABA over both ICSs and LABA. Among

ICSs, sales of Formoterol prevailed, and among LABAs — Salmeterol. Modern guidelines have proven greater effectiveness of Formoterol. But sales of combination drugs correspond to modern guidelibes: total sales of combinations of Formoterol with ICS probably prevailed.

Conclusions to Chapter 3

During the master's thesis, it was interviewed 29 pharmacists aged 21 to 41 years, among which male predominated, and among them there were 41.38% of full-time pharmacists. Analysis level of general knowledge of pharmacists about pharmacological classes of drugs for the BA treatment, their side effects and methods of application demonstrated that the significantly ($p \leq 0.05$) majority of pharmacists are guided by the choice of pharmacological classes of drugs for short-term symptom control (SABA) and long-term symptom control (ICSs). It is also important for most pharmacists to know about the anti-inflammatory properties of inhaled ICS and to focus on low, medium and high-doses of these drugs. However, from 24% to nearly 38% of pharmacists believe that ICSs may cause systemic side effects such as arterial hypertension, hyperglycemia and obesity.

More than 60% of pharmacists know what guidelines regulate BA pharmacotherapy and know about the stepwise approach to treatment. Just fewer than 70% of pharmacists are aware of the need for continuous use of ICSs by patients with BA, and more than 86% know about the need for combination inhalation therapy of ICSs and LAVA with 3 steps of BA pharmacotherapy. But pharmacists aren’t sufficiently guided by the recommendations of the GINA 2024 regarding the choice of LABA, which is also confirmed by the likely low sales of the recommended Formoterol.

Analysis of sales at the pharmacy of drugs for the treatment of asthma showed their non-compliance with modern recommendations. Sales of SABA and Salmeterol, whose effectiveness is lower than Formoterol, significantly ($p \leq 0.05$) prevailed. But sales of combination drugs comply with modern recommendations:

total sales of combinations of Formoterol with ICS significantly ($p \leq 0.05$) prevailed.

Assessment of the practical implementation of the pharmacist's role in achieving "asthma control" demonstrated that pharmacists don’t pay due attention to teaching patients to independently use inhalation devices and do not pay due attention to the choice of inhalation device. At the same time, a significant ($p \leq 0.05$) majority of full-time pharmacists are interested in whether patients have ICSs, explain the need for continuous long-term use of ICSs, and advise on preventing side effects from ICSs use.

CONCLUSIONS

1. 36 sources of literature were studied and the main areas of pharmacist work aimed at achieving “asthma control” were described.

2. To study the role of the pharmacist in achieving “asthma control”, a questionnaire was developed, consisting of 4 parts and 22 questions.

3. The survey was attended by 29 pharmacists aged 22.85±4.76 years; 10 female (34,48%) and 19 male (65,52%). Among the respondents, 12 (41,38%) are full-time pharmacist, including 7 (58,33%) are 5th year students of the National University of Pharmacy.

4. An analysis of general knowledge of pharmacists about pharmacological classes of drugs for the BA treatment, their side effects and methods of application demonstrated that the significant ($p \leq 0.05$) majority of pharmacists are guided by the choice of pharmacological classes of drugs for short-term symptom control (SABA) and long-term symptom control (ICSs). It is also important for most pharmacists to know about the anti-inflammatory properties of inhaled ICSs and their doses. However, from 24% to nearly 38% of pharmacists believe that ICSs may cause systemic side effects.

5. An analysis of knowledge of pharmacists about modern guidelines for BA pharmacotherapy showed that more than 60% of pharmacists know what guidelines regulate BA pharmacotherapy and know about the stepwise approach to treatment. Just fewer than 70% of pharmacists are aware of the need for continuous use of ICSs by patients with BA, and more than 86% know about the need for combination inhalation therapy of ICSs and LAVA with 3 steps of BA pharmacotherapy. But pharmacists aren’t sufficiently guided by the recommendations of the GINA 2024 regarding the choice of LABA, which is also confirmed by the likely low sales of the recommended Formoterol.

6. Analysis of sales at the pharmacy SABA and LABA showed their non-compliance with modern recommendations. But sales of combination drugs

comply with modern guidelines: total sales of combinations of Formoterol with ICSs significantly ($p \leq 0.05$) prevailed.

7. An analysis of practical implementation of the pharmacist's role in achieving “asthma control” demonstrated insufficient practical implementation of this role. The pharmacists don’t pay enough attention to teaching patients to independently use inhalation devices and do not pay due attention to the choice of inhalation device. At the same time, a significant ($p \leq 0.05$) majority of full-time pharmacists are interested in whether patients have ICSs, explain the need for continuous long-term use of ICSs, and advise on preventing side effects from ICSs use.

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APPLICATIONS

APPLICATION A

Proceedings of the 1st International Scientific and Practical Conference
"Modern Scientific Research: Theoretical and Practical Aspects"
April 14-16, 2025
Riga, Latvia
EUROPEAN OPEN SCIENCE SPACE

ANALYSIS OF PHARMACISTS' KNOWLEDGE REGARDING ANTI-INFLAMMATORY THERAPY OF BRONCHIAL ASTHMA

Najla Grine
Master's student
Natalia Zhabotynska
PhD, associate professor
Department pharmacology and clinical pharmacy
National University of Pharmacy, Kharkiv, Ukraine

Bronchial asthma (BA) is one of the most common major non-communicable disease and for many, has a substantial impact on quality of life. The Global Bronchial asthma Report indicates that the global prevalence of BA is 9.1% among children, 11.0% among adolescents, and 6.6% among adults. BA affected an estimated 262 million people in 2019 [3 Global] and caused 455 000 deaths.

The main mechanisms of BA development may include airway inflammation, control of airway tone and reactivity. The aim of BA is to gain and maintain control of the disease (defined as "asthma control"). Inhaled medication can control BA symptoms and allow people with BA to lead a normal, active life. In BA pharmacotherapy, our focus going forward should be firmly on improving not only short-term symptoms, but also the long-term respiratory and other health outcomes.

Pharmacists, together with outpatient and inpatient physicians, can play an important role in achieving "asthma control". Effective communication between the patient and pharmacist can help achieve patient adherence to maintenance ICS medications and prevent adverse events and mortality associated with bronchodilator overuse in the absence of ICS. Educating patients about mechanisms of action, adverse drug reactions, and counseling on medication regimens are the most common tasks pharmacists perform. Given this, it is important that pharmacists focus on improving patients' understanding not only of the causes and symptoms of BA and inhaler technique, but also of treatment regimens and the importance of adherence.

The purpose of the research was to study pharmacists' knowledge regarding anti-inflammatory BA therapy.

To achieve the research purpose, a questionnaire was developed, consisting of 4 parts and 22 questions. One part of the questionnaire was devoted to studying the level of knowledge of pharmacists about anti-inflammatory BA therapy. The survey was attended by 29 pharmacists aged 21 to 41 years; 10 female (34,48%) and 19 male (65,52%).

62.54% of surveyed pharmacists know that asthma pharmacotherapy is regulated by the Global Initiative for Asthma (GINA) 2024 guidelines. 58.62% of the surveyed pharmacists know about the step-by-step approach to BA treatment, which consists of

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5 steps. 51.72% of the surveyed pharmacists know about the existence of 2 approaches to BA treatment according to the GINA 2024 guideline.

When asked about the mandatory pharmacological class should all patients with BA receive, almost 70% answered inhaled corticosteroids (ICS), and 17.24% chose short-acting beta-agonists (SABA). In our opinion, the choice of SABA by pharmacists is due to the fact that these drugs are used to relieve asthma attacks (achieve a short-term effect) in all patients, but it is precisely ICS that are needed to achieve a long-term "asthma control" in the treatment of BA. The number of pharmacists who choose ICS for all patients with BA isn't significant different from the number of pharmacists who are aware of the anti-inflammatory properties of ICS in BA.

When asked which groups of drugs are recommended for combination inhalation therapy of BA the vast majority of pharmacists — 86,20% — chose the correct answer IGS + long-acting beta-agonists (LABA). It is also important for pharmacists to understand that the implementation of combination therapy should be carried out using a fixed-dose combination in a single inhalation device. This approach to BA pharmacotherapy can bring benefits by reducing critical errors in inhaler management, improving adherence to treatment and reducing costs, while maintaining the same clinical effectiveness. All of these benefits should be explained by pharmacists to patients when choosing drugs for combination inhalation therapy of BA.

Certain difficulties were caused by the choice of a drug from the pharmacological class LABA. The GINA 2024 guideline emphasize that the drug of choice from the LABA for combination inhalation therapy is Formoterol. This recommendation is based on the availability of data from randomized controlled trials and meta-analyses on the long-term safety and efficacy of the combination of Beclomethasone ICS and Formoterol LABA. There is currently no evidence for the safe and effective use of the combination of ICS with Salmeterol (LABA). Indacaterol and Vilanterol are recommended for patients who have had a history of asthma exacerbations in the previous year. Among the pharmacists surveyed 58,62% chose Formoterol and 34,5% Salmeterol as their drug of choice.

Summarizing the results of the analysis of pharmacists' knowledge of modern recommendations for BA pharmacotherapy, we can say that only slightly more than 60% of pharmacists know which guidelines regulate BA treatment and how many steps the stepwise approach to BA treatment has. Almost 70% understand that all patients with BA should receive ICS and more than 85% know that starting from step 3 they should be combined with LABA. However, only about 60% know that Formoterol should be used for this. It is noteworthy that pharmacists who work all the time are almost 100% correctly oriented in modern recommendations for BA pharmacotherapy.

The results of the study indicate the need to increase the level of knowledge of modern recommendations for the BA treatment in order to improve their participation in achieving "asthma control".

APPLICATION B

EUROPEAN OPEN SCIENCE SPACE

CERTIFICATE
of participation

Najla Grine

took part in the 1st International Scientific and Practical Conference

«MODERN SCIENTIFIC RESEARCH: THEORETICAL AND PRACTICAL ASPECTS»

12 Hours of Participation
(0,4 ECTS credits)

Head of the
organizing committee
Helen Volokitina

EOSS-25/0414-007 April 14-16, 2025, Riga, Latvia

clinical problem, both as a symptom of a range of other conditions such as asthma, chronic obstructive pulmonary disease, gastroesophageal reflux, and as a problem in its own right in patients with chronic cough of unknown origin. Therefore, understanding the clinical and pharmacological aspects of the rational use of over-the-counter (OTC) cough medications is absolutely essential for the modern pharmaceutical professional.

Aim. Research on the range of OTC medicines used in the treatment of cough and presented on the pharmaceutical market; development of questionnaires for surveying pharmaceutical workers and senior students of specialty 226 Pharmacy and Industrial Pharmacy of the National University of Pharmacy regarding their awareness of the rational use of these medicines; conducting anonymous questionnaires among the specified contingents; analysis of the respondents' answers.

Materials and methods. To achieve the research goal, the following methods were used in the work: bibliosemantic analysis of scientific literature, sociological survey (questionnaire), statistical processing of results, system analysis.

Results and discussion. Based on the results of the analysis of data from open information sources, we conducted a study of the range of OTC drugs used in the treatment of cough, created a questionnaire that included questions about the nomenclature, pharmacological properties, side effects, features of use and pharmaceutical care when dispensing antitussive, expectorant, mucolytic and other drugs used in the treatment of this symptom, and conducted a survey of respondents.

Conclusions. The results of the study allowed us to assess the level of awareness of pharmaceutical workers and students regarding the clinical and pharmacological aspects of the rational use of OTC drugs for the treatment of cough.

RESEARCH INTO THE PHARMACIST'S ROLE IN ACHIEVING "ASTHMA CONTROL"

Najla Grine
Scientific supervisor: Zhabotynska N.V.
National University of Pharmacy, Kharkiv, Ukraine
najlagrine1909@gmail.com

Introduction. Bronchial asthma (BA) is a globally significant non-communicable disease with major public health consequences, including high morbidity, and mortality in severe cases. Today, BA pharmacotherapy is carried out by family physicians on an outpatient basis or by pulmonologists in hospitals; however, pharmacists can also make a useful contribution to achieving "asthma control" due to their knowledge of pharmacology and clinical pharmacology of drugs and frequent contact with the patient when patients receive prescription medications. Studying the practical implementation of the pharmacist's role in achieving "asthma control" will allow identifying problematic issues and suggesting ways to solve them.

Aim. The purpose of the research was to study pharmacist's role in achieving "asthma control".

Materials and methods. To achieve the research purpose, a questionnaire was developed, consisting of 4 parts and 22 questions. The survey was attended by 29 pharmacists aged 21 to 41 years; 10 female (34,48%) and 19 male (65,52%). Among the respondents, 12 (41,38%) are full-time pharmacist, including 7 (58,33%) are 5th year students of the National University of Pharmacy. Statistical methods were used to analyze the results obtained.

Results and discussion. The literature describes in sufficient detail the areas of activity of pharmacists that contribute to achieving "asthma control". The GINA 2024 recommendations pay special attention to teaching patients the correct technique for using inhaled medications. Only 5 (48%) working pharmacists on their own initiative teach patients how to use an inhaler. But this indicator isn't significant ($\varphi_{emp.}$ = 0.82; p = 0.206). At the same time, 11 (91,66%) pharmacists respond to patients' requests, which is a significant majority ($\varphi_{emp.}$ = 4.826; p ≤ 0,05). A very important issue is the choice of inhalation device, with which the inhaled drug will be delivered to the lungs. When asked about the recommended type of inhalation device, significantly higher ($\varphi_{emp.}$ = 1.693; p = 0.0453) 7 (58,33%) pharmacists answered that they choose it according to the drug prescribed to the patient with BA. 3 (25%) answered that they do not pay attention to this. 2 (16,66%) chose dry powder inhalers which are in the GINA 2024 guidelines. The survey results showed that significantly higher than those who do not ($\varphi_{emp.}$ = 1.665; p = 0.048) 8 (66.66%) pharmacists ask patients who buy LABA or SABA whether they have ICS. However, only 6 (50%) explain the need for ICS treatment and recommend purchasing ICS to patients with BA. However, no significant difference was found between the number of pharmacists who counsel patients about the need to use ICS or didn't do this. When asked whether they explain to patients the need for continuous ICS use, 8 (66,66%) pharmacists (a significantly majority — $\varphi_{emp.}$ = 1.665; p = 0.048) answered "yes" provided that patients ask about the duration of ICS use. We obtained similar results in response to the question of whether pharmacists explain methods to prevent side effects of ICS: 8 (66,66%) pharmacists advise patients on this issue, which is a significantly majority — $\varphi_{emp.}$ = 1.665; p = 0.048.

Conclusions. Evaluating the practical implementation of the pharmacist's role in achieving "asthma control", it was found that pharmacists don't pay enough attention to teaching patients how to use inhalation devices on their own initiative and do not pay due attention to the choice of inhalation device. At the same time, the significantly (p≤0,05) majority of full-time pharmacists are interested in whether patients have ICS, explain the need for continuous long-term use of ICS, and advise on the prevention of side effects from ICS use.

Ф А 2.2.1-32-366

National University of Pharmacy

Faculty Pharmaceutical
Department of Pharmacology and Clinical Pharmacy

Level of higher education master

Specialty 226 Pharmacy, industrial pharmacy
Educational and professional program Pharmacy

APPROVED
The Head of Department
Pharmacology and
Clinical Pharmacy

Sergii SHTRYGOL
«02» September 2024

ASSIGNMENT

FOR QUALIFICATION WORK
OF AN APPLICANT FOR HIGHER EDUCATION

Najla GRINE

1. Topic of qualification work: «Research into the role of the pharmacist in achieving control of bronchial asthma», supervisor of qualification work: Nataliia ZHABOTYNSKA, PhD, assoc. prof.
approved by order of NUPh from "27" of September 2024 № 237
2. Deadline for submission of qualification work by the applicant for higher education: May 2025.
3. Outgoing data for qualification work: publications on problems in the pharmacotherapy of bronchial asthma; scientific data on the study of the role of pharmacists in achieving control of bronchial asthma.
4. Contents of the settlement and explanatory note (list of questions that need to be developed):
to develop a questionnaire for surveying pharmacists; to study the level of knowledge of pharmacists regarding pharmacotherapy of bronchial asthma; to determine the practical implementation of the pharmacist's role in achieving control of bronchial asthma.
5. List of graphic material (with exact indication of the required drawings):
- GINA recommendation for stepwise bronchial asthma pharmacotherapy (1 figure);
- role of pharmacists in bronchial asthma management (1 figure);
- general characteristics of pharmacists participated in the survey 2 figures);
- analysis of pharmacists' knowledge regarding the BA pharmacotherapy (8 figures; 1 table);
- assessment of the practical implementation of the pharmacist's role in achieving bronchial asthma control (1 figure);

- analysis of sales of drugs for the bronchial asthma pharmacotherapy (3 figures).

6. Consultants of chapters of qualification work

Signature	**Name, SURNAME, position of consultant**	**Signature, date**	
		assignment was issued	**assignment was received**
1	Nataliia ZHABOTYNSKA, associate professor of higher education institution of Clinical Pharmacology and Clinical Pharmacy department	12.09.2024	12.09.2024
2	Nataliia ZHABOTYNSKA, associate professor of higher education institution of Clinical Pharmacology and Clinical Pharmacy department	06.03.2025	06.03.2025
3	Nataliia ZHABOTYNSKA, associate professor of higher education institution Clinical Pharmacology and Clinical Pharmacy department	03.04.2025	03.04.2025

7. Date of issue of the assignment: “02” September 2024

CALENDAR PLAN

№	**Name of stages of qualification work**	**Deadline for the stages of qualification work**	**Notes**
1.	Writing Chapter 1 "Literature Review"	December 2024	**done**
2.	Development of a questionnaire for conducting a survey of patients	December 2024	**done**
3.	Conducting a patient survey, writing Chapter 2 "Research Methods"	March 2025	**done**
4.	Statistical processing of survey results	March 2025	**done**
5.	Writing Chapter 3 "Research Results"	March 2025	**done**
6.	Finalization of qualification work and preparation of documents	May 2025	**done**

An applicant of higher education _____ Najla GRINE

Supervisor of qualification work _____Nataliia ZHABOTYNSKA

ВИТЯГ З НАКАЗУ № 237

По Національному фармацевтичному університету

від 27 вересня 2024 року

Затвердити теми кваліфікаційних робіт здобувачам вищої освіти 5-го курсу Фм20(4,10д) 2024-2025 навчального року, освітньо-професійної програми – Фармація, другого (магістерського) рівня вищої освіти, спеціальності 226 – Фармація, промислова фармація, галузь знань 22 Охорона здоров'я, денна форма здобуття освіти (термін навчання 4 роки 10 місяців), які навчаються за контрактом (мова навчання англійська та українська) згідно з додатком № 1.

Прізвище, ім'я здобувача вищої освіти	Тема кваліфікаційної роботи		Посада, прізвище та ініціали керівника	Рецензент кваліфікаційної роботи
по кафедрі фармакології та клінічної фармації				
Грін Нажла	Дослідження ролі фармацевта в досягненні контролю бронхіальної астми.	Research into the role of the pharmacist in achieving control of bronchial asthma.	доцент Жаботинська Н.В.	професор Литвинова О.М.

Ректор

Вірно. Секретар

ФА2.8-03-317

ВИСНОВОК

експертної комісії про проведену експертизу
щодо академічного плагіату у кваліфікаційній роботі

здобувача вищої освіти

«30» квітня 2025 р. № 331090742

Проаналізувавши кваліфікаційну роботу здобувача вищої освіти Грін Нажла, групи Фм20(4.10) англ-03, спеціальності 226 Фармація, промислова фармація, освітньої програми «Фармація» навчання на тему: «Дослідження ролі фармацевта в досягненні контролю бронхіальної астми / Research into the role of the pharmacist in achieving control of bronchial asthma», експертна комісія дійшла висновку, що робота, представлена до Екзаменаційної комісії для захисту, виконана самостійно і не містить елементів академічного плагіату (компіляції).

Голова комісії,
проректор ЗВО з НПР,
професор **Інна ВЛАДИМИРОВА**

Ф А 2.2.1-32-353

REVIEW

of scientific supervisor for the qualification work of the master's level of higher education of the specialty 226 Pharmacy, industrial pharmacy

Najla GRINE

on the topic: «Research into the role of the pharmacist in achieving control of bronchial asthma»

Relevance of the topic. Bronchial asthma is one of the most important medical and social problems. The disease with ineffective control leads to a significant impairment of the quality of life. Despite a wide selection of drugs for long-term control of bronchial asthma, at least half of patients have an uncontrolled course of bronchial asthma. The study of the pharmacist's role in achieving bronchial asthma control is a component of a comprehensive approach to solving the problems of pharmacotherapy of bronchial asthma and is an actual direction of research.

Practical value of conclusions, recommendations, and their validity. The practical significance of the results of the master's thesis lies in assessing the possibilities and practical implementation of the pharmacist's role in achieving bronchial asthma control and in identifying problematic issues that need to improve the pharmacist's participation in achieving bronchial asthma control.

Assessment of work. The qualification work is a completed research, designed in accordance with all requirements. It is recommended to conduct an additional check of spelling errors.

General conclusion and recommendations on admission to defend. The work is performed in full, designed in accordance with the current requirements for the qualification works at the National University of Pharmacy, and can be recommended for submission to the Examination commission for further defense.

Scientific supervisor _____ Nataliia ZHABOTYNSKA

«12» May 2025

Ф А 2.2.1-32-356

REVIEW

for qualification work of the master's level of higher education, specialty 226 Pharmacy, industrial pharmacy

Najla GRINE

on the topic: «Research into the role of the pharmacist in achieving control of bronchial asthma»

Relevance of the topic. According to international experts, approximately 5% of the world's population suffers from bronchial asthma. Moreover, the proportion of severe forms of bronchial asthma is growing. Despite the presence of certain problems, over the past 10 years, modern medicine has achieved very significant success in the pharmacotherapy of bronchial asthma, but the problem of achieving control over bronchial asthma is becoming increasingly important. Therefore, there is a need to study the role of the pharmacist in achieving control over bronchial asthma.

Theoretical level of work. The qualification work has a high theoretical level, based on the international guidelines for the pharmacotherapy of bronchial asthma.

Author's suggestions on the research topic. The author developed a questionnaire for a survey of pharmacists, based on the survey data, an analysis of pharmacists' knowledge of modern approaches to the selection of drugs for pharmacotherapy of this disease was conducted, an analysis of the compliance of sales of pharmacological drugs with modern recommendations was conducted and the practical implementation of the pharmacist's role in achieving control of bronchial asthma was assessed.

Practical value of conclusions, recommendations, and their validity. The results of the qualification work and the conclusions made on their basis are of great practical importance for increasing the role of the pharmacist in achieving control of bronchial asthma.

Disadvantages of work. There are grammatical and punctuation errors, unsuccessful stylistic turns in the work.

General conclusion and assessment of the work. The work meets the requirements for qualification work in National University of Pharmacy and can be recommended for defense.

Reviewer _____ Olga LYTVYNOVA

«14» May 2025

МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ
НАЦІОНАЛЬНИЙ ФАРМАЦЕВТИЧНИЙ УНІВЕРСИТЕТ
ВИТЯГ З ПРОТОКОЛУ № 19
засідання кафедри фармакології та клінічної фармації

15 травня 2025 р. м. Харків

Голова: завідувач кафедри, доктор мед. наук, професор Штриголь С. Ю.
Секретар: кандидат фарм. наук, доцент Вєтрова К. В.

ПРИСУТНІ: зав. каф., проф. Штриголь С.Ю., проф. Деримедвідь Л.В., доц. Бєлік Г.В., доц. Вєтрова К.В., доц. Жаботинська Н.В., доц. Кононенко А. В., доц. Матвійчук А.В., доц. Отрішко І.А., доц. Очкур О.В., доц. Рябова О.О., доц. Савохіна М.В., доц. Степанова С. І., доц. Таран А.В., ас. Верховодова Ю.В., ас. Підгайна В.В. та здобувачі вищої освіти.

ПОРЯДОК ДЕННИЙ:
1.Розгляд кваліфікаційних робіт здобувачів вищої освіти для подання робіт до Екзаменаційної комісії.

СЛУХАЛИ:
1.Здобувачку вищої освіти Грін Нажлу зі звітом про проведену наукову діяльність за темою кваліфікаційної роботи: «Дослідження ролі фармацевта в досягненні контролю бронхіальної астми» («Research into the role of the pharmacist in achieving control of bronchial asthma»).

УХВАЛИЛИ:
1. Кваліфікаційну роботу розглянуто. Здобувачка вищої освіти Грін Нажла допускається до захисту даної кваліфікаційної роботи в Екзаменаційній комісії.

Голова
Завідувач кафедри, проф. Штриголь С. Ю.

Секретар, доц. Вєтрова К. В.

Ф А 2.2.1-32-042

НАЦІОНАЛЬНИЙ ФАРМАЦЕВТИЧНИЙ УНІВЕРСИТЕТ

ПОДАННЯ
ГОЛОВІ ЕКЗАМЕНАЦІЙНОЇ КОМІСІЇ
ЩОДО ЗАХИСТУ КВАЛІФІКАЦІЙНОЇ РОБОТИ

Направляється здобувачка вищої освіти Нажла ГРІН до захисту кваліфікаційної роботи за галуззю знань 22 Охорона здоров'я
спеціальністю 226 Фармація, промислова фармація
освітньо-професійною програмою Фармація
на тему: «Дослідження ролі фармацевта в досягненні контролю бронхіальної астми».

Кваліфікаційна робота і рецензія додаються.

Декан факультету _____ / Микола ГОЛІК /

Висновок керівника кваліфікаційної роботи

Кваліфікаційна робота здобувачки вищої освіти Нажли ГРІН є самостійним оригінальним дослідженням, виконана на високому науковому рівні, відповідає всім вимогам, може бути представлена в Екзаменаційну комісію Національного фармацевтичного університету та рекомендована до захисту на здобуття освітньо-кваліфікаційного рівня магістра та заслуговує позитивної оцінки.

Керівник кваліфікаційної роботи

_____ Наталія ЖАБОТИНСЬКА

"12" травня 2025 року

Висновок кафедри про кваліфікаційну роботу

Кваліфікаційну роботу розглянуто. Здобувачка вищої освіти Нажла ГРІН допускається до захисту даної кваліфікаційної роботи в Екзаменаційній комісії.

Завідувач кафедри
фармакології та клінічної фармації

_____ Сергій ШТРИГОЛЬ

"15" травня 2025 року

Qualification work was defended
of Examination commission on
« » June 2025
with the grade _____
Head of the State Examination commission,
DPharmSc, Professor
_____ / Volodymyr YAKOVENKO/