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**Vaistinių etiketės, rašytinė informacija ir vaistų vartojimo režimo laikymasis:
PLIMA tyrimas**

**Pharmacy Labels, Written Information and Medication Adherence: PLIMA
study**

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LIST OF ABBREVIATIONS

USP – United States Pharmacopeia;

WHO – World Health Organization;

ESPACOMP – European Society for Patient Adherence, COMpliance, and Persistence;

EU – European Union;

NHS – National Health Service;

BNF – British National Formulary;

OTC – over the counter.

SUMMARY

Kornelija Klinkaitė, Master's thesis titled "Pharmacy Labels, Written Information and Medication Adherence: PLIMA study". Supervisor doc. dr. Indrė Trečiokienė. Vilnius University, Faculty of Medicine, Institute of Biomedical Sciences, Centre of Pharmacy.

Aim: Compare pharmacy labels and written information use in practice, legal requirements and specialists' perception across European countries.

Objectives: 1) Compare how pharmacy information on dispensed medicines is provided for patients across European countries; 2) Compare the legal requirements on written information and pharmacy label provision in the pharmacies across European countries; 3) Assess the differences in specialists' perception on pharmacy labels and written information; 4) Evaluate Lithuanian pharmacists' opinions on different types of pharmacy labels and written information, and their practical application in Lithuania.

Methods: In this study pharmacy labels and written information is considered as pharmacy dispensing labels or other similar way to provide written information for patients when dispensing medication. Data for the study was collected through the Qualtrics survey platform using a structured questionnaire. Legal requirement documents, pictures of pharmacy labels and other examples of written information, provided to the patients were collected using Dropbox. Mixed methods research design was chosen for data analysis. Quantitative data were analysed using descriptive statistics, and qualitative data were analysed using descriptive content analysis. Qualitative thematic analysis was used to analyse the focus group discussion data.

Results: Participants from 32 different countries participated in the study. In 63% (n=20) of countries included in the study the standard practice is to provide patients with written information by pharmacists sticking a label directly on the package. Similarly, in 59% (n=19) it is a standard to write information directly on the medication package. The percentages exceed 100%, as the most common practice is to use combination of few different methods. Image analysis identified differences in content, format, colours and symbols used in written information across countries. There are legal requirements for providing written information and pharmacy labels in pharmacies in the 10 countries that were represented in this study. Most common requirements on labels include instruction on how to use medicine, patient name and pharmacy name where the medication was dispensed. 81% of specialists perceived pharmacy labels and written information both as intervention enhancing medication adherence and safe medicine use. Five Lithuanian pharmacists included in this study expressed the need for standardized written information in the country. They identified that the best practice would be the use of standardized pharmacy labels, similar to the Estonian example, including instructions for use, medication name, strength and quantity dispensed, as well as the

pharmacy name and address and the prescribing physician's name. The patient's name was considered optional due to patient privacy considerations and preference.

Conclusions: 1) The most common practise is to provide written information by sticking a label, writing directly on the package, or using combination of both methods; 2) Most common legal requirements are to include instructions on how to use medicine, patient name and pharmacy name where the medication was dispensed; 3) The majority of specialists in this study perceive pharmacy labels and written information both as intervention enhancing medication adherence and safe medicine use; 4) Pharmacists identified that the best practise would be the use of standardized pharmacy labels, similar to the Estonian example.

Key words: Medication use; Written Information; Medication Adherence.

SANTRAUKA

Kornelijos Klinkaitės Magistro baigiamasis darbas „Vaistinių etiketės, rašytinė informacija ir vaistų vartojimo režimo laikymasis: PLIMA tyrimas“, mokslinė vadovė doc. dr. Indrė Trečiokienė, Vilniaus Universiteto Medicinos fakulteto biomokslų institutas Farmacijos ir farmakologijos centras.

Tyrimo tikslas: Palyginti vaistinių etikečių ir rašytinės informacijos reikalavimus, jų praktinį pritaikymą ir specialistų požiūrį Europos šalyse.

Tyrimo uždaviniai: 1) Palyginti rašytinės informacijos ir vaistinių etikečių teikimo pacientams praktiką Europos šalyse; 2) Palyginti teisinių reikalavimų, taikomų vaistinių etiketėms ir rašytinei informacijai, skirtumus Europos šalyse; 3) Įvertinti specialistų požiūrį apie vaistinių etiketes ir rašytinę informaciją; 4) Įvertinti Lietuvos vaistininkų nuomonę apie įvairių tipų vaistinių etiketes ir rašytinę informaciją bei jų praktinį pritaikymą Lietuvoje.

Tyrimo metodai: Šiame tyrime vaistinių etiketės ir rašytinė informacija laikomos vaistų išdavimo metu pacientams pateikiamos etiketės ar kita rašytinė informacija, susijusi su vaistų vartojimo instrukcijomis. Tyrimo duomenys surinkti *Qualtrics* apklausų platformoje, naudojant struktūrizuotą klausimyną su atvirojo ir uždarojo tipo klausimais. Teisiniai dokumentai, vaistinių etikečių nuotraukos ir kita rašytinė informacija surinkta naudojant *Dropbox*. Duomenų analizei pasirinktas mišrus analizės metodas. Kiekybiniai duomenys analizuoti naudojant aprašomąją statistiką, o kokybiniai – aprašomąją turinio analizę. Fokus grupės diskusijai analizuoti naudota kokybinė teminė analizė.

Rezultatai: Tyrime dalyvavo specialistai iš 32 skirtingų šalių. Nustatyta, kad 63% (n=20) tyrime dalyvavusių šalių informacija apie vaistų vartojimą pateikiama naudojant specialias etiketes. 59% (n=19) tyrime dalyvavusių šalių informacija pateikiama rašant tiesiogiai ant išduodamų vaistų pakuočių. Procentinė suma viršija 100%, nes dažniausiai vaistinėse naudojamos skirtingų informacijos teikimo būdų kombinacijos. Pateiktų nuotraukų analizės metu identifikuoti skirtumai tarp pateikiamos informacijos turinio, išdėstymo, spalvų ir naudojamų simbolių. Nustatyta, kad 10 šalių galioja teisiniai reikalavimai nustatantys rašytinės informacijos teikimo tvarką. Dažniausi reikalavimai yra suteikti informaciją raštu apie vaisto vartojimą, paciento vardą pavardę ir vaistinės, kurioje išduotas vaistas, pavadinimą. Nors rašytinė vaistų informacija dažniausiai suvokiama kaip vaistų vartojimo saugumo užtikrinimo priemonė, 81% specialistų ją vertino ne tik kaip saugumo užtikrinimo priemonę, bet ir kaip svarbų veiksni prisidedantį prie geresnio vaistų vartojimo režimo laikymosi. Visi penki fokus grupės diskusijoje dalyvavę Lietuvos vaistininkai sutiko, kad yra poreikis standartizuoti rašytinę informaciją. Nustatyta, kad geriausiai Lietuvoje galėtų būti pritaikoma etiketė naudojama Estijos praktikoje. Etiketėje turėtų būti nurodoma vartojimo instrukcija, vaisto pavadinimas, stiprumas ir išduotas kiekis, vaistinės pavadinimas ir adresas, gydytojo vardas pavardė.

Vaistininkai nusprendė, kad paciento vardo pavardės nurodymas turėtų būti neprivalomas, atsižvelgiant į paciento privatumą ir pageidavimus.

Išvados: 1) Vaistų išdavimo metu specialistai dažniausiai naudojami specialiomis etiketėmis, nurodo informaciją raštu tiesiai ant dėžutės arba naudoja abu metodus; 2) Dažniausi teisiniai reikalavimai teikiant informaciją raštu yra nurodyti vaisto vartojimo instrukciją, paciento vardą pavardę ir vaistinės pavadinimą; 3) Didžioji dalis specialistų rašytinę informaciją suvokia kaip priemonę pagerinančią vaistų saugumą ir vartojimo režimo laikymąsi; 4) Vaistininkai vieningai nutarė, kad Lietuvoje turėtų būti naudojamos standartizuotos vaistinių etiketės, panašios į Estijos praktikoje naudojamas etiketes.

Raktažodžiai: Vaistų vartojimas; rašytinė informacija; vaistų vartojimo režimo laikymasis.

INTRODUCTION

Written information is often considered as a safety measure, but research show that it can also be connected to a better medication adherence. Written information and pharmacy labels contain crucial information for patients about their treatment, like directions on how to use the drug, when to use it and what to avoid while taking drug. It can also contain visuals that help the patient to understand instructions better. Research done in the United States shows that an increase in antihypertensive, asthma controller and contraceptive medication adherence was found after the introduction of prescription medication labels that followed USP patient-centered labelling standards. The labelling standards included emphasized information that is important to patient, improved readability, clear instructions, incorporated purpose of use, addressed low health-literacy and visual impairments. (1) Health literacy refers to individuals' ability to understand the basic health information and services needed to make an appropriate health decision. It means to be able to find, understand, assess and use information and services to ensure overall health and wellness. (2) For that reason, it is health care specialists' duty to provide patients with readable and understandable information, while dispensing medication.

Different pharmacy labelling practises and legal requirements exist across the Europe. In this fast-paced era and the need for accessible and effective treatments, understanding the differences across countries and assessing specialist's perception, can provide valuable lessons for healthcare systems. Furthermore, the insights drawn from this research may serve as a catalyst and could help shape more effective healthcare policies in Lithuania and other European countries. Moreover, it could encourage a re-evaluation of pharmacy labelling and written information requirements, potentially leading to more efficient and adherent medication usage.

Aim: Compare pharmacy labels and written information use in practise, legal requirements and specialists' perception across European countries.

Objectives:

- 1) Compare how pharmacy information on dispensed medicines is provided for patients across European countries.
- 2) Compare the legal requirements on written information/ pharmacy label provision in the pharmacies across European countries.
- 3) Assess the differences in specialists' perception on pharmacy labels and written information.
- 4) Evaluate Lithuanian pharmacists' opinions on different types of pharmacy labels and written information, and their practical application in Lithuania.

Student's participation in international and Lithuanian conferences:

- 1) Kornelija Klinkaitė, Indrė Trečiokienė. Vaistininkų nuomonė apie rašytinės informacijos reikšmę vaistų vartojimo režimo laikymuisi. Pilotinis tyrimas // 77th Conference of the Student Scientific Activity Network (SMVT) conference, Vilnius University, Vilnius, 2025-05-06. (appendix 1)
- 2) Kornelija Klinkaitė, Rūta Matulaitienė, Nomeda Bratčikovienė, Anne Gerd Granas, Indrė Trečiokienė. Pharmacy Labels and Written Information on Medication Adherence: PLIMA study protocol // European Drug Utilization Conference 2025, July 1-4, 2025, Uppsala, Sweden. (appendices 2 and 3)
- 3) Kornelija Klinkaitė, Rūta Matulaitienė, Nomeda Bratčikovienė, Tanja Fens, Anne Gerd Granas, Indrė Trečiokienė. Pharmacy Labels and Written Information on Medication Adherence: PLIMA study // 29th ESPACOMP Conference, November 13-14, 2025, Malaga, Spain. (appendices 4,5,6)
- 4) Kornelija Klinkaitė, Indrė Trečiokienė. Vaistinių etikečių ir rašytinės informacijos reikšmė vaistų vartojimo režimo laikymuisi // 78th Conference of the Student Scientific Activity Network (SMVT) conference, Vilnius University, Vilnius, 2026-05-04. (appendix 7)

1. LITERATURE REVIEW

1.1 Medication adherence

The problem of nonadherence appears to be as old as the practise of medicine itself. In the 5th century B.C. Hippocrates made a note: ‘Keep a watch also on the faults of the patients, which often make them lie about the taking of things prescribed... For through not taking disagreeable drinks, purgative or other, they sometimes die. What they have done never results in a confession, but the blame is thrown upon the physician’. (3)

1.1.1 Definition and taxonomy of medication adherence

According to the World Health Organization (WHO), adherence can be described as ‘the extent to which a person’s behaviour-taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a health care provider’. Adherence is often misinterpreted or even used as a synonym of compliance. Adherence requires that the patient accepts and agrees to the recommended regimen and that is what makes it different from compliance. Efficient clinical practise is based on good communication between health care specialist and patient, as well as patient involvement in decision making processes. (4) Typically, it is assessed over a defined period and expressed as a percentage, indicating the extent to which a patient’s medication-taking behaviour aligns with the prescribed regimen. (5) Singh and Varshney analysed different medication taking scenarios. *Figure 1* shows four different scenarios identified by the authors. Desirable medication-taking behaviour is demonstrated in section I. Section II demonstrates intentional nonadherence to the treatment, when the patient decides not to take the medication. A complex situation, when the patient is intentionally nonadherent to the treatment is showed in section III. Section IV represents a situation, when the patient is unintentionally not adherent. (6)

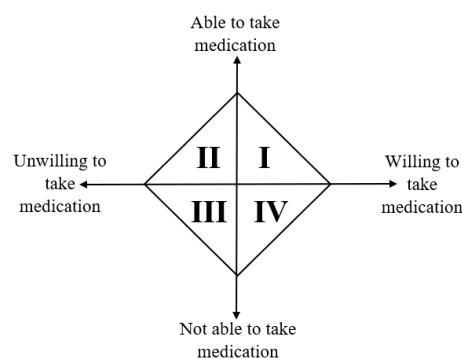


Figure 1. Medication scenarios. Adapted from Singh and Varshney. (6)

Seventh Framework Programme for Research and Technological Development funded project “*Ascertaining Barriers for Compliance: policies for safe, effective and cost-effective use of medicine in Europe*” in collaboration with ESPACOMP has developed ABC taxonomy for medication adherence in 2012. The ABC taxonomy has been translated to seven languages and used all over the world to facilitate measurement and analysis of medication adherence. Medication adherence consists of three elements: initiation, implementation and discontinuation. Initiation starts, when the first dose of prescribed medicine is taken. After the patient begins treatment, the next stage is implementation of the dosing regimen. This refers to how closely the patient’s actual medication use aligns with the prescribed schedule, continuing from the first dose until the final dose is taken. The last element of medication adherence is discontinuation. This element signals the end of therapy, occurring when a scheduled dose is not taken and no further doses are taken afterwards. Another term widely used in medication adherence research is persistence. It refers to the duration between treatment initiation and the final dose taken, which occurs immediately before discontinuation. Initiating the prescribed treatment later than intended or not starting it at all, as well as sub-optimally implementing the dosing regimen or discontinuing the treatment early, are examples of possible non-adherence scenarios. (7)

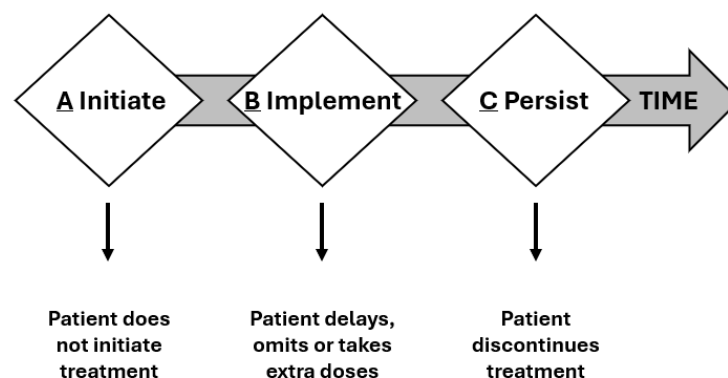


Figure 2. Medication adherence: ABC Taxonomy. Adapted from the ESPACOMP official website.

1.1.2 Prevalence of nonadherence

According to Eurostat data, 35 % of people aged 16 years or older in 2023 in the EU reported having a long-standing health problem or illness. (8) This means that more than a third of people in the EU are struggling with a health problem that requires a long period of monitoring, observation and care. Chronic diseases, like cardiovascular diseases are a global health problem, because of their high morbidity and mortality, which continues to rise. (9) Lee et al. states that nonadherence to antihypertensive medication treatment globally ranged from 27% to 40% over the period 2010-2020. (10) In Lithuania over 50% of the patients prescribed antihypertensives (11) and statins (12) were not using their medication after one year. This leads to consequences including poor management of

blood pressure, increased rates of cardiovascular complications and death. Not monitored chronic diseases can lead to serious complications that can reduce the quality of life of the patient. Adherence to the treatment plan is essential for patients with such health problems to manage chronic diseases. (10,13)

1.2 Barriers to medication adherence

Kvarnstrom et al. analysed barriers to medication adherence. Barriers can be patient-specific, illness-specific, medication-specific, health care and system-specific, social and culture-specific, logistical and financial. (14) Barriers to adherence vary some can be influenced directly, while others result from the nature of illnesses and health problems, and some demand national or policy level interventions. (15)

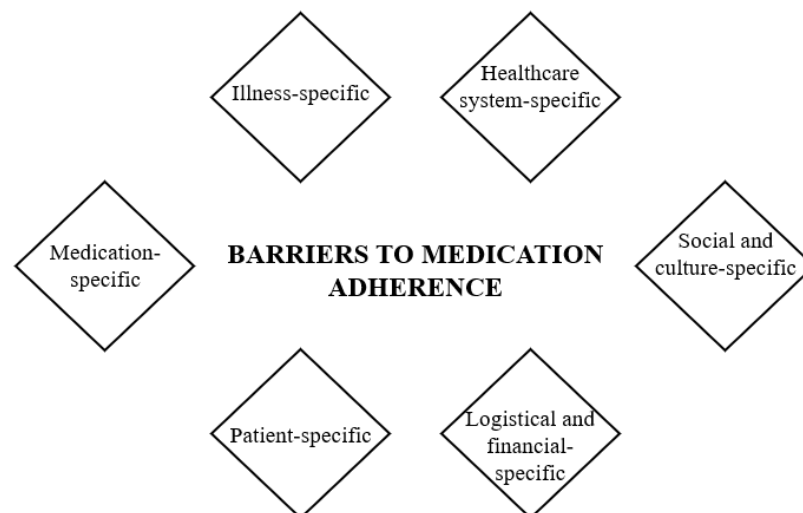


Figure 3. Barriers to medication adherence. Adapted from Kvarnstrom et al. (14)

Medication-specific barriers include adverse effects, polypharmacy and administration regimens. (14,16) Adherence issues can arise in patients who deal with polypharmacy, caused by both the fear of taking multiple drugs and the increased chance to miss a dose. (17–19) Fear of adverse events seems to be a barrier to being adherent. People are not motivated to take their medication, when they have thoughts of not being safe or having to experience some side effects while taking the drug. (20) Some physical barriers also affect medication adherence: the size of the tablet or capsule can make it hard to swallow it, taste and/or smell of the medication might not be pleasant. Patients can feel confused about their condition, treatment duration and prognosis. (21) More complex medication dosing regimens are connected to greater difficulty following prescribed medication regimen. (16–19)

Illness-specific barriers include the poor understanding of disease, which is linked to medication nonadherence. (18–21) Patients might not accept the illness or blame it on someone else. Jarab et al. study shows that a negative approach may be illustrated through negative attitudes toward chronic illnesses and their consequences for daily life, like diabetes. This type of negative thinking can negatively impact medication adherence. (22) Fatigue and stress caused by the illness can also be the factors negatively affecting adherence. (21)

Healthcare-specific barriers also contribute to reduced adherence rates. Seng et al. systematic review and meta-analysis demonstrates that medication adherence tends to be lower when healthcare accessibility is limited and waiting times are longer. (23) Support and patient education from physicians can positively impact adherence, while loss of confidence and trust in healthcare specialist can be linked to lower adherence. (23,24) According to Gellad et al., patients with hypertension who did not prioritize communication about their condition with the physician were significantly more likely to not follow the treatment regimen. This shows how patient-prescriber relationship is connected to medication adherence. (16) The patients should feel confident and comfortable to get information about their condition from professionals, not the Internet or social media. (15) Poor communication between patient and healthcare specialist can lead to unclear instructions. This is a major barrier, directly impacting patient's ability to understand and follow the regimen. (15,23) Patients are more likely to be nonadherent, when they perceive disagreements between their physicians. Disagreements may lead to patient confusion and contribute to a loss of trust. (23)

Among vulnerable populations, supportive social environments contribute significantly to medication adherence and enables them to stay in their homes longer. (15) A lack of support from family members and/or friends can have a huge impact on medication adherence. (15,18,25) Isolating and avoiding talking about illnesses can also be a social barrier that affects medication adherence. Horvat et al. suggests that patient associations and their organised meetings, activities can contribute to members sharing their experiences, struggles, information and support, which can positively affect the medication adherence. (15) Hermsen et al. states that sometimes people avoid taking their medication in public, especially if there is a stigma about their disease. In order to hide their diseases, patients might avoid taking their medication in public places, which has a direct impact on medication adherence. (25)

According to Turner et al., high cost of drugs, drugs not being covered by insurance, having to switch from original to a generic drug and transportation to the pharmacy are identified as possible logistical and financial barriers that influence medication adherence. (26) Some patients do not have access to medication due to their economic difficulties and/ or unemployment. Limited access to medicines might also be caused by medicine shortage and availability in some countries. (14,26)

Sociodemographic, psychological profile, cognitive function and beliefs about health are common patient-specific barriers to medication adherence. (16,25) Even though most characteristics like age, gender, race and comorbidities are not possible to change, other patient-specific barriers can be modified. (16) Insufficient knowledge is also considered as a barrier to medication adherence. People who have less medical knowledge about their prescribed medication are more likely to be less adherent. (27) Educating patients about their disease, so that they understand real potential risks of their condition might help to minimize incorrect beliefs about health and promote motivation to be adherent to the treatment. (16,24,27) Seng et al. explains that poor health literacy is also connected to nonadherence. (23) Taking medications correctly to achieve successful medication adherence an adequate level of health literacy is needed. (28) Issues might occur if the written information is not provided in a simple and understandable way or not in patient's mother tongue language. Patients' health literacy levels also play a significant role in medication adherence. (14)

From medication adherence perspective pharmacy labels and written information provided in the pharmacy could address at least two factors related to non-adherence. Healthcare-specific barriers could be addressed by strengthening patients' confidence and trust toward pharmacists and the healthcare system, through the provision of clear written information, as well as patient education on their diseases. Patient-specific barriers could be addressed as clear written information provides better understanding of the treatment regimen, particularly among patients with limited health literacy. (23)

1.3 Health literacy

1.3.1 Definition

According to WHO, health literacy reflects the knowledge, and skills individuals develop through everyday experiences, social engagement and intergenerational learning. These abilities are shaped by organizational systems and resource availability, which determine individuals' ability to access, understand, evaluate, and use information and services to maintain and sustain well-being. It means to be able to find, understand, assess and use information and services to ensure overall health and wellness. (29)

1.3.2 Elements of health literacy

Health literacy consists of three elements:

- 1) understanding of health, healthcare and healthcare system;
- 2) handling and using health and healthcare related information in various formats;

- 3) the capacity to maintain health through self-management and working together with health care specialists. (29)

Knowledge of health, healthcare and healthcare systems refers to understanding of information about these elements. Knowledge of health includes understanding of healthy behaviours, lifestyle, health terms and public health. Knowledge of healthcare system is understanding basic structure and services that are available. Handling and using health and healthcare related information in various formats describes whether people can process and use information that is related to health effectively. This involves the ability to process and use information to guide health goals, provision of health information and access to resources and support for processing information. The capacity to maintain health through self-management and working together with health care specialists requires abilities to self-regulate and achieve goals. Self-regulation requires to be aware of one's own health situation, to think critically and have the ability to control oneself. Achieving goals requires the ability to set meaningful health goals and strategies to reach it. (2,29)

Prior knowledge for analysing health materials or consulting a healthcare specialist includes understanding vocabulary and key health concepts, as well as mechanisms of how the body functions. Printed and oral literacy that is connected to health depends on an individual's health related reading fluency, vocabulary and how familiar the person is with the concept. These set of skills and resources that enables an individual to interpret health information, interact with health professionals and the health care system are visualised in *Figure 4*. Health literacy can lead to more positive health behaviours and better health results. (2,29)

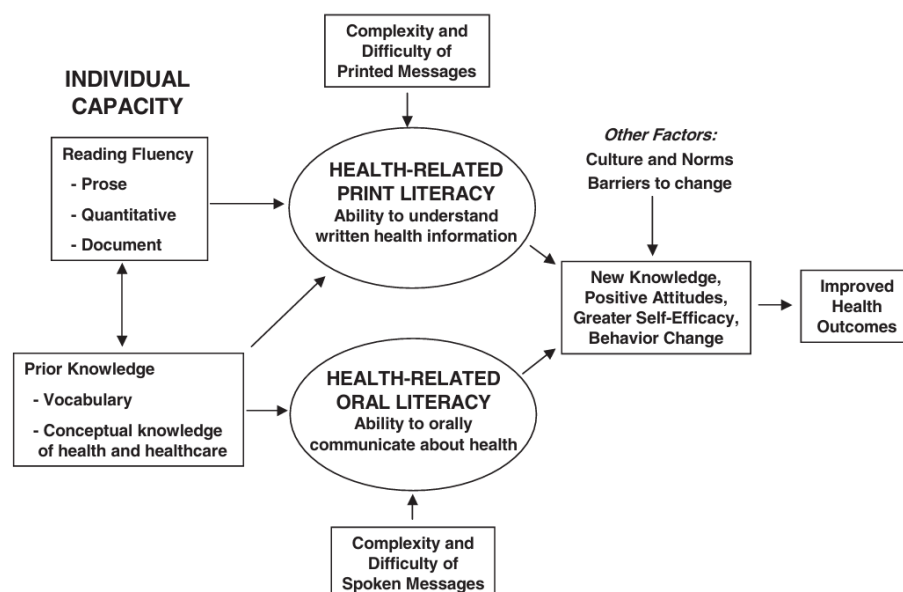


Figure 4. Conceptual model of the relations between individual capacities, health-related print and oral literacy, and outcomes. (2)

According to Miller T.A., patients with lower health literacy skills have on average 14% lower rates of adherence, than patients that have higher health literacy skills. Health literacy interventions can improve patients' level of health literacy by 22% and adherence to the treatment by 16%. (30) One of the challenges to improve health literacy is that it is not easy for physicians and pharmacists to identify people who have low health literacy. Some patients with low literacy feel ashamed and do not seek for help even from their family members. It is important to understand challenges some patients face and that it can negatively impact their health condition. (31)

1.4 Economic impact of nonadherence

Medication nonadherence is associated with higher healthcare costs. A range of outcomes is used to assess the economic impact of medication nonadherence, including total healthcare costs, inpatient and outpatient costs, pharmacy expenditures, medical costs and hospitalization expenses. Among disease groups there are significant differences in the range of costs. (32)

Medication nonadherence is also associated with indirect costs, like productivity. Asthma and chronic obstructive pulmonary disease (COPD) patients, who adhere to their treatment have significantly less days absent from work, which leads to potential annual savings. (33) The literature associates non-adherence among patients with depression with adverse clinical outcomes, such as increased risk of relapse, higher rates of emergency department use and hospitalization, increased depression severity, and lower response and remission rates, ultimately contributing to higher healthcare utilization and costs. The same trend was seen in nonadherent patients using medications to treat psychosis and schizophrenia. (34,35)

As chronic diseases become more prevalent worldwide, the economic, clinical and humanistic consequences of medication nonadherence are expected to grow. Major reductions in healthcare costs can be achieved by improving medication adherence, as it enhances treatment effectiveness and promotes better patient outcomes. (32)

1.5 Strategies to improve medication adherence

It is important to identify and apply strategies to improve medication adherence. Each strategy should be applied and tailored to an individual situation. Strategies can be mixed and adapted to the specific needs of patients to achieve the best possible improvements in medication adherence. Effective strategies, such as simplification of drug regimen, motivational interviews and formation of positive habits, reminders, patient care and information can help to improve medication adherence. (36,37)

Nonadherence to treatment is connected to the complexity of the treatment. The rates of nonadherence are more likely to increase, when the medication regimen is more complex. (28,38) To simplify drug regimen and improve adherence a polypill could be a good choice, especially in patients who deal with polypharmacy. There are some factors that limit these combination formulations, like availability, possible high cost and the fact that not all drugs can be used at once. (37) According to Parati et al., the use of a single pill combination reduces pill burden and improves adherence, which then improves blood pressure control and lowers the risk of cardiovascular events in patients who struggle with hypertension. Although in some patients' single pill combination lowers the adherence rates. This is explained by higher adherence among patients who were also prescribed cardiovascular or diabetes medication. As these patients are at increased risk of cardiovascular events, they may be more motivated to maintain adherence to their treatment. (38)

Motivational interviewing targets factors such as the severity of illness, individual vulnerability, and perceived benefits and barriers both before and after the intervention is applied. Parwati et al. claims that after motivational interviews adherence to medication, beliefs in one's ability and motivation to make a change increased in patients with tuberculosis. (39) Identifying possible hints that are connected to medication use and motivation can help to form positive habits that help to maintain medication adherence. Keeping medication where the meals are eaten can help to remember to take the medication with the meal, or placing it next to the bed, when medication must be taken before sleep. (40) These positive habits can help to maintain good adherence on days when it is more likely to not be followed, like holidays or weekends. The presence and support of family members and friends can significantly improve patients' ability to adhere to their prescribed medication regimens by providing practical assistance and emotional support. Mayberry et al. claims that diabetes patients who experienced lack of support from their relatives were more likely to be less adherent to their treatment. (41)

The use of technology may help to overcome difficulties associated with forgetting to take medication on time. Reminders given through text messages and smartphone applications are effective interventions, that also provides feedback on adherence in an individual level, like smartphone applications that can capture response data of the patient. This helps patients to be more adherent, especially if the medication is dosed weekly or atypically. (40,42) Text messages with reminders to pick up medication refills from the pharmacies also showed positive impact on better adherence. (42)

Significant improvement in adherence is noticed in cases, when patients are provided with clear instructions, counselling and health education. Patients are more likely to be adherent, when they understand pathology of their disease and what can happen, if they do not follow the treatment plan. (28,43) Patients who are not involved in the decision-making process together with their

physician or do not understand their treatment, are more likely to be less adherent. (44) Enhancing patients' health literacy can be an effective tool to improve how the patient manages their condition, including how adherent they are to the treatment. (28,30) Study conducted by Awan et al. shows that educational sessions focused on condition, symptoms, medication, questions and answers from the patients and medication adherence had a statistically significant improvement on adherence in patients with schizophrenia. Tailored to the needs of each participant these educational sessions were conducted individually with a healthcare specialist or within small group settings. (45) Healthcare literacy and adherence to lifestyle changes and medication use can be improved using telephonic outreach, when patients get regular calls from a healthcare provider. This might be a better option for patients who struggle or cannot attend educational sessions in person. (46) In summary, previously discussed studies show, that written information may be considered as an effective tool for improving medication adherence.

1.6 Written information and pharmacy labels

1.6.1 History of labels

The evolution of labelling practises throughout the twentieth century reflects a gradual transition from limited regulation toward a more structured system aimed at protecting public health. Early legislative efforts, such as the 1906 *Federal Food and Drugs Act*, focused primarily on prohibiting false or misleading claims, but did not mandate standardized or comprehensive labelling. Although later amendments introduced requirements, these measures proved insufficient, as consumers often relied more on packaging than on written information. A more significant shift occurred in 1938 when the *Federal Food, Drug and Cosmetic Act* was signed. According to this law, scientific evidence had to be provided by the drug manufacturers proving the safety of new products before their release to the market. Drugs had to be labelled with directions for use and warnings, with such information appearing on the container of the product. In the early 1940s, developments in drug labelling focused on defining the distinction between prescription and nonprescription medicines. Regulatory efforts aimed to make labelling requirements stricter by improving warnings, restricting misleading promotion, and refining professional labelling practises. Despite these efforts, labelling practises stayed inconsistent, as both manufacturers and retailers continued to blur the boundary between prescription and over-the-counter drugs. In 1944, stricter criteria were introduced, stating that a drug should be labelled as prescription-only only if it is potentially dangerous and therefore needs supervision by a healthcare professional. This criterion contributed to the eventual legal distinction between prescription and nonprescription drugs in 1951. Labelling became an essential

tool for providing use information and restricting access to potentially dangerous substances by designating them for professional supervision. However, enforcement remained challenging due to ambiguities in legal definitions and judicial interpretations, which often limited regulatory effectiveness. Despite these limitations, the increasing focus on clarity, accuracy and safety in labelling highlighted its rising importance in protecting patients and ensuring the proper use of medicines. (47–49)

1.6.2 Early labelling practises

Bristol-Mayers Squibb European Apothecary collection kept at the Smithsonian Institution's National Museum of American History in Washington, D.C. has more than two hundred early prescription labels from apothecaries across Austria and Germany. Prescription labels from eighteenth and nineteenth centuries are very different from the labels that are used today. Two centuries ago, labels were different in shape, colour and elements. Labels were made in triangular shape, often colourful and included images of animals or significant buildings linked to the apothecary's name. In the nineteenth century, internal and external use medications were separated based on the colour of the label. Labels included information like pharmacist's name, the name and address of the apothecary, where the medication was dispensed. Pharmacists used to attach labels to the neck of the medication bottle with a piece of string. (50)



Figure 5. Prescription labels from eighteenth and nineteenth century. (50)

The Lithuanian Museum of the History of Medicine and Pharmacy has several collections of prescription labels from 1918-1940. One side of the label used to include the prescription number, the names of prescriber and patient, the date of preparation, the price, instructions for use and the dosage. Other side listed the components of the medication along with their dosages. Different pharmacies used distinct symbols on their prescription labels. Pharmacies with greater financial resources often used labels featuring symbols that were more personalized and associated with the pharmacy itself or the city where it was located. (51)

1.6.3 Importance of written information and labels

It is a key responsibility of a healthcare specialist to provide patients with complete, readable and understandable information about their medication. At the start of a new medication therapy, patients typically receive drug label instructions alongside verbal information from their physician and/or pharmacist. (52,53) According to Maghroudi et al., about 40 to 80% of the spoken information is forgotten. Medication label information focuses solely on the most essential instructions for the patient about the drug use and are often used as the last source of information, before consuming the drug. Therefore, drug labels should be comprehensible for all patients. (53) Improved comprehension is achieved when written information is provided in plain language, in patients' native language, numbers are written in a numerical format and clear time periods in dosage instructions are given. Medical jargon should be avoided in written information that is given to the patient, due to possible misunderstandings. (53,54) It is often assumed that patients can read and understand dosing instructions that are provided to them by the pharmacists or physicians, but dosing instructions are often mis-read or mis-understood. Different labelling practises and legal requirements vary across Europe, but there is no standard, universal procedure on how to provide written information when dispensing medication. (52) Readability and plain language, format and organization, as well as pictograms and illustrations, are key elements of written information and labelling that enhance patient comprehension. (52,54)

1.6.3.1 Readability and plain language

Sometimes patients have difficulties reading dosing instructions or even the name of the medicine. Pharmacists should try to write in block capitals or if possible, have the dosing instructions printed on dispensing label, so it would be easier for the patient to read. (52) Mullen et al., claims that the use of plain language and user-friendly text improves patients' attitude, navigability and understanding of written information. Also, patients tend to worry less about the treatment, when they

have clear instructions. This leads to reduced medication errors, increased adherence and safe medication using behaviours. (54) Patients often misunderstand dosage instructions that indicate multiple daily uses without specifying the timing ‘1 tablet 2 times a day’. It is easier to be adherent when medication intake is connected to dayparts ‘1 tablet in the morning’ or mealtimes, but it is important to understand that some people tend to skip certain meals throughout the day. Specifying drug intake using time intervals ‘every 8 hours’ should be avoided, as a lot of people tend to misunderstand them. (53) It is also considered good practise to confirm understanding with patients by asking them to read dispensing labels and explain how they intend to use the medication, to clarify any doubts and misinterpretations before the drug is dispensed. (52)

1.6.3.2 Format, pictograms and illustrations

Format and organization tools used in written text can enhance patient comprehension. These tools include formatting characteristics such as use of bullet points, underlining, bolding, bigger font sizes and headings. Using numbered lists rather than information written in paragraph gives a chance to navigate, understand and recall the information easier for the patients. (54)

Pictograms paired with simple instructions increase patient drug knowledge, recall and adherence, especially in patients with lower health literacy. (54) The European guideline on the readability of the label and package leaflet of medicinal products for human use states that symbols and pictograms may be useful, provided their meaning is clear and the graphics are large enough to be easily legible. It further specifies that they should only be used to support navigation or to clarify and emphasize aspects of the text and must not replace the written information. (55)

Studies show that different pharmacy labelling and written information practises exist across countries. In this fast paced era and the need for accessible and effective treatments, understanding these differences and assessing specialist’s perception, can provide valuable lessons for healthcare systems. Furthermore, the insights may help shape more effective healthcare policies in Lithuania and other European countries, potentially leading to more efficient and adherent medication usage.

2. METHODOLOGY

2.1 Research design

A mixed methods research design was selected in order to compare pharmacy labels and written information use in practise, legal requirements and specialists' perception across European countries.

The selection of this research design was based on several key considerations:

- 1) Mixed methods research design allows for the collection of both quantitative and qualitative data. (56)
- 2) Mixed methods research design enhances the generalizability of findings through quantitative data while also providing in-depth contextual understanding from qualitative data, which does not require strict sample size criteria but instead relies on theoretical relevance aligned with the study aims. (57)
- 3) Mixed methods research adopts a flexible and interpretive approach by incorporating qualitative data.
- 4) Qualitative data collection in mixed methods research design relies on purposefully selecting participants for their personal experiences, characteristics and social contexts that can provide the most accurate and comprehensive answers to the research questions.
- 5) Mixed methods research design generates new insights and ideas by integrating quantitative and qualitative data, allowing for a more comprehensive understanding of the research problem. (56)

2.2 Sampling strategy

The survey participants were invited to participate using a combination of purposive and snowball sampling methods. Purposive sampling was done when survey respondents were selected based on the publicly available members list of The COST Action "European Network to Advance Best practises and technology on medication adherence" (ENABLE), which seeks to establish a multidisciplinary network of stakeholders collaborating on the economically viable implementation of medication adherence-enhancing technologies across European healthcare systems. In addition, more respondents were invited to take part in the study through invitations disseminated at conferences and relevant specialist platforms. The list of respondents includes pharmacists, medical doctors, nurses and other healthcare professionals. Snowball sampling involved participants sharing the survey with colleagues who had expertise or familiarity with pharmacy practise.

The study was designed without a predetermined sample size, as it is not required in qualitative studies. (56) However, a minimum criterion was set to include at least one expert from each country invited to participate in the study.

Inclusion criteria for the respondents:

- 1) The respondent agreed to consent to participate in the study.
- 2) The respondent had a professional affiliation with the healthcare sector, either through current employment or through formal education in a healthcare-related field.
- 3) The survey was fully completed, except for the sections requiring uploading pictures of the labels, written information and legal documents.

An invitation to participate in focus group discussion was posted in a relevant Facebook group. Additionally, 13 invitations were sent directly to pharmacists. Only practising pharmacists were eligible for inclusion. Regional variation was favoured when recruiting.

2.3 Data collection

Data for the study was collected through the Qualtrics survey platform using a structured questionnaire. Collected quantitative data included respondents' sociodemographic information. Both qualitative and quantitative data were collected on pharmacy label practises, experts' opinions on written information, and legal aspects of label provision. Closed-ended questions generated quantitative data, while open-ended follow-up questions allowed respondents to elaborate on their choices and provide examples from practise, generating qualitative data. Qualitative data also included picture examples of labels provided by respondents. Legal requirement documents, pictures of pharmacy labels and other written information were collected using Dropbox. As this information take time to gather, the participants were able to leave the survey and re-enter to finish it later (up to two weeks from the start date).

Data collection was carried out in four waves between July 2025 and February 2026. Invitations to participate were sent via email multiple times. During the first and second waves, 326 invitations were distributed, and data were collected between July and August 2025. In the third wave, invitations were sent only to countries from which responses had not yet been received, with data collection occurring between September and November 2025. The fourth wave targeted the remaining countries without prior responses, and data collection took place from January to February 2026. Focus group discussion was conducted in April 2026 via MS Teams platform. The discussion lasted approximately 90 minutes. Open-ended questions were raised to facilitate in-depth discussion among participating pharmacists. The discussion was audio-recorded with participants' prior consent.

2.4 Research instrument

The questionnaire was tested in a pilot study conducted in Lithuanian pharmacies in March 2025. Survey questions were used in 12 interviews with pharmacists from different pharmacy chains. The results were presented in the Student Scientific Activity Network event. (58) Before answering the questions, respondents were required to provide consent to participate. The introductory section outlined the purpose and structure of the research, indicated the estimated time needed to complete the survey, and presented detailed instructions. Participants were also informed that all responses are collected anonymously.

The research instrument is composed of 3 blocks of questions:

Block 1 – Responders' information

In this section of the study, respondents' demographic information is collected, including country of residence, gender, educational background, main working position, and the number of full years of experience within or related to the healthcare system in their country. This part of the questionnaire consists of five questions.

Block 2 – Labelling information and adherence innovation

This section collects information on how written pharmacy information for dispensed medicines is provided to patients in participants' countries, including its content. Respondents are invited to share links or pictures of these materials or labels in pharmacies using Dropbox and to indicate whether they view written pharmacy information as intervention supporting safe medicine use, enhancing medication adherence, or both.

Block 3 – Legal requirements

This section of the study consists of questions regarding the legal requirements for pharmacy labels and written information in the participants' countries, including whether such requirements exist and, if so, what they specify. Respondents are also asked to provide links to relevant legal documents.

A semi-structured discussion guide was used during the focus group. Participants were asked to discuss and identify the key elements they considered most important in pharmacy labels and written information, as well as to indicate which label formats they found most appropriate. Participants also evaluated examples of international pharmacy labelling practises and discussed their applicability in the Lithuanian practise.

2.5 Data preparation and analysis

The analysis of survey responses was conducted in four steps: first, examining answers regarding written pharmacy information and labels; second, evaluating experts' perceptions on written information; third, analysing the legal requirements in each country; and fourth, reviewing images provided by participants.

For the researchers' convenience, each respondent was identified as 'R' followed by their country name (e.g., R_Albania). For multiple responses from the same country, a number was added (e.g., R_Bulgaria_1, R_Bulgaria_2).

Mixed methods research design was chosen for data analysis, which include both quantitative and qualitative methods. Closed-ended questions were analysed using descriptive statistics. Textual data, including open-ended follow-up questions responses and legal documents, were analysed using descriptive content analysis, a method that systematically examines textual information. (56) Responses and documents were read repeatedly to identify key categories based on relevant keywords. Meaningful elements were then extracted, and for certain categories, the content was further broken down to highlight essential components. These elements were subsequently organized into subcategories and interpreted to generate insights into the study findings. (56,59) *Microsoft Excel* was used to present the results of the study in tabular form. Images of pharmacy labels and other written materials were analysed using an inductive qualitative content approach, focusing on categories of information provided in the written form. Key informational elements were identified and summarized in a table, to demonstrate variations across countries. To further illustrate these findings, image examples were provided, demonstrating how the identified information appears in practice.

Qualitative thematic analysis of transcribed discussions was used to analyse focus group discussions. Answers were coded and organized into categories reflecting patterns. These categories were further developed into broader themes, which were interpreted and supported with representative participant quotes.

2.6 Research ethics and funding

As this study does not involve the collection of data directly related to patients or the public, an application for ethical approval was not required. This assessment was confirmed using the Medical Research Council self-assessment tool from NHS Health Research Authority. All participants of focus group were informed about the purpose of the study and their role in the focus group prior to participation. Audio recordings were used solely for research purposes and were

deleted after transcription. The study was conducted with full regard for transparency, respect, and research integrity. Participation in the survey and focus group discussion were entirely voluntary, and respondents were able to withdraw at any time. The confidentiality of all information obtained was strictly maintained throughout the research process.

PLIMA study was financed by the Economic Recovery and Resilience Improvement Measure, under the plan “New Generation Lithuania” and from the state budget of the Republic of Lithuania. In this study OpenAI ChatGPT (GPT-5.3) was used as a language editor.

3. RESULTS AND DISCUSSION

3.1 Respondents' sociodemographic data

A total of 94 responses were collected from which 52 (55,3%) met the study inclusion criteria. These 52 respondents were from 32 different countries.

Table 1. Number of respondents per country.

Country	Respondents
	n
Albania	1
Austria	1
Bosnia and Herzegovina	3
Bulgaria	2
Croatia	2
Cyprus	1
Czech Republic	1
Denmark	1
Estonia	1
Finland	1
Germany	2
Greece	2
Hungary	1
Iceland	1
Ireland	1
Lithuania	1
Malta	1
Moldova	1
Montenegro	1
Netherlands	2
North Macedonia	2
Norway	3
Portugal	1
Romania	1
Serbia	1
Slovakia	2
Spain	4
Sweden	2
Switzerland	2
Turkey	2
United Kingdom	4
Ukraine	1

*n – number of respondents.

Among the 52 respondents who participated in the study, 71,2% (n = 37) were female, and 28,8% (n = 15) were male.

67,3% (n = 35) of participants had a background education of a pharmacist. Other reported educational backgrounds among health care professionals included medicine, nursing, pharmaceutical engineering, systems medicine and bioinformatics research and biomedical sciences. One respondent indicated having no formal educational background directly related to health care. This response was retained and not excluded from the analysis, as this respondent was employed in a health data-related role.

Table 2. Sociodemographic and professional characteristics of the respondents.

		Respondents	
		n	%
Gender	Female	37	71.2
	Male	15	28.8
Background education	Pharmacist	35	67.3
	Nurse	2	3.9
	Medical doctor	9	17.3
	Other health care professional	5	9.6
	Not a health care professional	1	1.9
Main working position	Pharmacy	9	17.3
	Primary care	3	5.8
	Secondary/tertiary care	5	9.6
	Pharmaceutical company	1	1.9
	Public/governmental institution	2	3.9
	Academia	19	36.5
	Two or more positions in a healthcare sector	7	13.5
	Other	6	11.5
Number of years of professional involvement in healthcare	Up to 5 years	8	15.4
	From 5 to 10 years	1	1.9
	From 10 to 20 years	22	42.3
	From 20 to 30 years	12	23.1
	30 years and more	8	15.4
	Did not answer	1	1.9

*n – number of respondents.

The data show that 36,5% (n = 19) of respondents indicated academia as their main or one of the main working positions, while 17,3% (n = 9) reported working in a pharmacy. In contrast, none of the respondents identified a wholesaler as their main working position. Seven respondents indicated more than one working position as their main. Respondents who selected ‘other’ as their main working position reported working in positions such as the Association for Pharmacists, the

Scientific Institute of the Health Insurance Funds, an innovation centre, a health data-related role, and a patient engagement specialist position.

The data indicate that most respondents in this study (n = 22; 42,3%) reported having from 10 to 20 years of professional work experience in health care sector. In contrast, the smallest proportion of participants had from 5 to 10 years of experience (n = 1; 1,9%).

3.2 Labelling and written information provision

Pharmacy labelling and the provision of written medication information vary across countries. In this study, respondents were asked to indicate how written information is typically provided in their country. The response options included sticking a label on the package, writing information by hand directly on the package, providing a medicine use list in paper or digital form, other methods, or cases where no written information is provided at all. The results are summarized in Table 3. It is a common practise to provide patients with written information by sticking a label on the medication package in 62,5% (n=20) countries included in this study. Similarly, in 59,4% (n=19) countries the information is typically provided by pharmacists writing directly on the medication package. Other methods of information provision included written information contained within medication package, supplementary brochures distributed to patients, and clarifications that written information is, in some cases, provided only upon patient request.

Table 3. Provision methods of written pharmacy information on dispensed medicines across countries.

	n	%
Pharmacist sticks label with information on the package	20	62.5
Pharmacist writes information on the package by hand	19	59.4
A medicine use list is provided to the patient	10	31.3
Medicine use information is provided digitally	7	21.9
Other	8	25.0
No written information is provided	3	9.4

*Percentages were calculated using the total number of countries in the study (n = 32). Few options were allowed; therefore, percentages exceed 100%.

**n – number of countries.

3.2.1 Information provided on dispensed pharmacy labels

Table 4. Comparison of information included in pharmacy labels across countries.

Country	Patient name	Medication name	Indication	Use information	Warnings	Dispensing date	Prescriber	Practise	Pharmacy	Pharmacy contact	Other
Denmark	✓		✓			✓			✓		✓
Finland	✓		✓	✓							✓
Iceland	✓		✓	✓							
Ireland	✓	✓		✓	✓						✓

“User name, indication for use, dose, date for expedition, name of pharmacy, active ingrediencies.” R_Denmark

“Patient name, dosage instructions, indication (unless there is a valid reason for omitting it), how much medicines are left on the prescription, how long the prescription is valid.” R_Finland

“Patient name, indication, use information.” R_Iceland

“Patient name, drug name, dose, frequency, any special warnings - normally from BNF, number of tablets etc.” R_Ireland

The qualitative study revealed that in four countries – Denmark, Finland, Iceland and Ireland – pharmacists provide written information on dispensed medications by affixing a label directly onto the packaging. In all these countries, the label includes the patient’s name and usage instructions; additionally, Denmark and Finland specify the medication’s indication, with Denmark further listing the dispensing date, pharmacy name, and active ingredients, while Finland notes the quantity of medication remaining on the prescription and the prescription’s validity period. Ireland also includes special warnings (typically from the BNF) and the medication quantity (Table 4).

3.2.2. Handwritten information on medication packages

Table 5. Comparison of information included in a written form directly on the medication package across countries.

Country	Patient name	Medication name	Indication	Use information	Warnings	Dispensing date	Prescriber	Practise	Pharmacy	Pharmacy contact	Other
Bosnia and Herzegovina				✓							
Bulgaria				✓							
Czech Republic	✓		✓	✓							
Malta	✓			✓							
Montenegro				✓							
North Macedonia				✓							
Serbia				✓							

“Only numbers, 1 $\tilde{A}$ —1 or 1+1/2+0.” R_Bosnia and Herzegovina

“Use information (dosage, how many times per day the drug should be taken).” R_Bulgaria_1

“Using information only.” R_Bulgaria_2

“Usually only the use information; when more medicines for one patient or medicines for different patients are dispensed, then also the name or indication can be written on the package.”

R_Czech Republic

“Patient name, use and dosage regimen.” R_Malta

“Use information” R_Montenegro

“Use information.” R_North Macedonia

“Dosage.” R_Serbia

In seven countries – Bosnia and Herzegovina, Bulgaria, Czech Republic, Malta, Montenegro, North Macedonia and Serbia – written pharmacy information is provided to patients by pharmacist writing the information directly on the package. A respondent from Bosnia and Herzegovina noted that it is common practise to write only numbers on the package. The study revealed that handwritten use information is provided in Bulgaria, Czech Republic, Montenegro and North Macedonia, additionally, Czech Republic and Malta include the patient’s name, while Bulgaria, Malta and Serbia specify the dosage. Additionally, it is common to specify the indication in a written form in Czech Republic (Table 5).

3.2.3. Information provided on dispensed medication label and/or by writing directly on the medication package

Table 6. Comparison of information included on pharmacy labels and/or in a written form directly on the medication package across countries.

Country	Patient name	Medication name	Indication	Use information	Warnings	Dispensing date	Prescriber	Practise	Pharmacy	Pharmacy contact	Other
Albania				✓	✓						
Croatia	✓			✓							
Cyprus											✓
Greece		✓		✓		✓			✓	✓	✓
Lithuania				✓							✓
Romania	✓	✓		✓			✓				✓

“In Albania, the written information on pharmacy labels is mainly provided for prescription medications and often for OTC products as well. Pharmacists typically write the regimen of use (e.g., dosage and frequency) and include practical precautions such as "before or after meals," "do not take with alcohol or caffeine," or "take with water." However, the information is usually brief and not standardized across pharmacies.” R_Albania

“Patient name, use information.” R_Croatia_1

“Use like part of the day exact dose (1/2, 1, 11/2 tablet xy ml etc) and the way of administration with without food etc.” R_Croatia_2

“How many times per day, before or after lunch.” R_Greece_1

“Medicine Name: Atorvastatin (brand: e.g RUPAFIN TAB)

Dosage Form / Strength: e.g 10MG/TAB

Directions for Use: e.g 1 BY NIGHT

Quantity Dispensed: e.g BTX30

Pharmacy Name & telephone

Date of Dispensing (Purchase Day): 12/06/2025.” R_Greece_2

“On the medicine package: Dose, administration rate, duration of treatment, with or without meals. If a patient leaflet is provided in the pharmacy (usually if the patient doesn't have one already from the physician), the pharmacist could write the followings: patient name, diagnostics, physician, pharmacist, medicines, posology and observations.” R_Romania

Results from the study indicate that in four countries – Albania, Croatia, Greece and Romania – it is common practise to provide patients with written pharmacy information either by sticking a label, writing directly on the medication package, or both. In all these countries, it is common practise provide patients with medication use information, additionally, in Croatia and Romania pharmacists include the patient’s name in written form. In Greece, pharmacists also include details such as the medicine name, dosage form and strength, quantity dispensed, pharmacy contact information and dispensing date. Romania further specifies diagnostics, prescribing physician, dispensing pharmacist and any relevant observations (Table 6).

Similar practise is common in Cyprus and Lithuania. In Cyprus, common practises include providing patients with labels containing written information about medication, writing details directly on the package, or not providing written information at all. In Lithuania, where providing written information is not mandatory, pharmacists typically deliver information in writing only upon patient request.

“Pharmacist writes directly on the box or sticks a label provided by the pharmacy, but it is not mandatory to provide patients with written information. Usually, what the patient asks to be included - when and how to use the drug”. R_Lithuania

3.2.4. Information provided on dispensed medication label and/or by providing a medicine use list

Table 7. Information included on pharmacy labels and/or in a medicine use list in Switzerland.

Country	Patient name	Medication name	Indication	Use information	Warnings	Dispensing date	Prescriber	Practise	Pharmacy	Pharmacy contact	Other
Switzerland	✓		✓	✓							

“Indication, use information.” R_Switzerland_1

“Patient name, indication, use information.” R_Switzerland_2

In Switzerland, written pharmacy information is provided to the patient by sticking a label directly on the medicine package, providing a medicine use list, or both. The provided information includes the patient’s name, medication indication and use information (Table 7).

3.2.5. Information provided on dispensed medication label, writing directly on the medication package, providing medicine use list or providing information digitally.

Table 8. Comparison of information provided on pharmacy labels, in a written form directly on the medication package, in a medicine use list and/or digitally across countries.

Country	Patient name	Medication name	Indication	Use information	Warnings	Dispensing date	Prescriber	Practise	Pharmacy	Pharmacy contact	Other
Estonia	✓	✓		✓			✓		✓	✓	✓
Turkey	✓	✓		✓							

“Patients' name, the name of the medication, usage information, number of the prescription, the doctors' name, name of the dispensing pharmacy, address of the pharmacy.” R_Estonia

“Patient name, Medicine name, dose etc.” R_Turkey_1

“Use information.” R_Turkey_2

Analysis of the responses reveal that in Estonia and Turkey written pharmacy information is provided to the patients by sticking a label on the package, writing directly on the package by hand, providing a medicine use list physically or providing medicine information digitally. In both countries usually pharmacists provide patients with information such as patient's name, medicine name, use information, additionally in Estonia it is common to provide number of prescriptions, the prescribers name, dispensing pharmacy name and address (Table 8).

The respondent from Estonia further explained that prescriptions and medication usage information can be shared with the patient digitally, through Health Portal. The respondent from Turkey explained that no official provisions exist for medication labels in the country, pharmacists commonly use labels at their discretion.

“Patients can see their prescriptions (and usage information) from a portal called Terviseportaal (in translation - Health Portal).” R_Estonia

“There is no official system for package labeling. Pharmacists use these labels based on their own practice.” R_Turkey_2

3.2.6. Information provided on dispensed medication label, writing directly on the medication package and/or providing medicine use list

Table 9. Comparison of information provided on pharmacy labels, in a written form directly on the medication package, in a medicine use list across countries.

Country	Patient name	Medication name	Indication	Use information	Warnings	Dispensing date	Prescriber	Practise	Pharmacy	Pharmacy contact	Other
Germany			✓	✓	✓						✓
Spain			✓	✓							

“Basic information, Composition, Indications, Dosage, Contraindications, Restrictions on use, Notes, Interactions, Pregnancy, Breastfeeding, Side effects, Intoxication, Storage instructions, Package information.” R_Germany_1

“The official package leaflet with indication, dosage, adverse effects.” R_Germany_2

“Indication and use information.” R_Spain_1

“Use information of the new and the former medications.” R_Spain_2

In Germany, usual practise is to stick a label on medication package, write details by hand or provide patients with medicine use list. The information includes details about composition, medication indication, dosage, contraindications, restrictions on use, side effects, storing instructions and package information. Similar practises are observed in Spain, the only difference is that sometimes no written information can be provided at all. If the information is provided in a written form, it usually consists of indication of the medicine and usage instructions (Table 9).

The second responder from Germany provided digital link to publicly available page called “Red list” where patients and specialists can find information about medication, such as indications, contraindications, dosing, and side effects. Also “Yellow page” link was provided, which includes news, information and databases for doctors, pharmacists, medical and pharmaceutical professionals. Respondent from Spain did not initially select the option indicating that information could also be provided digitally, however, they later noted that the pharmacist can provide digital links to videos with information on how to correctly use medical devices.

“How handle the medical device (for example Ventolin or an insulin) we send a video or a picture to the patient’s email, we don’t have any platform to provide that information.” R_Spain_3

3.2.7. Information provided on dispensed medication label, writing directly on the medication package, providing information digitally or not providing written information at all.

Table 10. Information included on pharmacy labels, in a written form directly on the medication package and/or digitally in Portugal.

Country	Patient name	Medication name	Indication	Use information	Warnings	Dispensing date	Prescriber	Practise	Pharmacy	Pharmacy contact	Other
Portugal	✓		✓	✓							✓

“It is variable; it can be patient name, indication, use information etc.” R_Portugal

Typical practise in Portugal is to provide patients with written information by sticking a label on the medication package, writing details by hand, providing information digitally or not providing written information at all. The written details encompass patient’s name, medication indication and use information, but can vary, depending on the clinical setting (Table 10).

3.2.8. Information provided writing directly on the medication package and/or providing medicine use list

Table 11. Comparison of information provided in a written form directly on the medication package and/or in a medicine use list across countries.

Country	Patient name	Medication name	Indication	Use information	Warnings	Dispensing date	Prescriber	Practise	Pharmacy	Pharmacy contact	Other
Hungary		✓	✓	✓							✓
Slovakia				✓							

“An optional table providing an overview of the patient’s medication regimen:

- What: the name of the medicine and its strength (e.g. mg, µg, IU).*
- Why: the indication or reason for taking the medicine.*
- How much: the prescribed dose and dosing frequency (e.g. two tablets per day).*
- When: the timing of administration (e.g. morning and evening).*
- How: specific instructions for use (e.g. before meals, swallow whole, etc.)*

This optional form is not completed routinely; however, its use is recommended during medication review conducted in the pharmacy. (pharmacists handwrite the dosing instructions on the product box in all cases, even in case of OTCs).” R_Hungary

“Dosing.” R_Slovakia

In Hungary and Slovakia, the widespread practise is to provide patients with medication information either by directly writing the details on the package or by providing a medicine use list. Respondent from Slovakia identified that only dosing details are provided to patients. In contrast, in Hungary it is common practise to offer patients an optional table summarizing their medication regimen. This table includes medication names, indications, dosage and usage. Although not mandatory, this approach is highly recommended, with dosing information required for all prescription and OTC medicines (Table 11).

3.2.9. Information provided on dispensed medication label, medicine use list and/or on a digital platform

Table 12. Comparison of information provided on pharmacy labels, medicine use list and/or digitally across countries.

Country	Patient name	Medication name	Indication	Use information	Warnings	Dispensing date	Prescriber	Practise	Pharmacy	Pharmacy contact	Other
Netherlands	✓		✓	✓	✓		✓				✓
Sweden	✓		✓	✓			✓		✓		✓
United Kingdom	✓	✓	✓	✓	✓	✓			✓	✓	

“Patient name, address, information about the medication, information how to use the medication (and when not to use), possible side effects, warnings and alerts (e.g. with breast feeding or pregnancy or interactions with other medications).” R_Netherlands_1

“Patient name, drug use, precautions, sometimes indication, prescriber.” R_Netherlands_2

“The patient's name and date of birth, or alternatively the name of the animal owner or keeper. The prescriber's instructions on how the medicine should be used and dosed, as well as the purpose of the treatment, or other instructions from the prescriber. The prescriber's name. The name of the outpatient pharmacy. The date of the comprehensive check and the number of packages dispensed. Other things can also be added depending on the drug.” R_Sweden_2

“Patient name, dosage instructions, indication.” R_United Kingdom_1

“Dispensing pharmacy name, address, phone number. Medication name, quantity and dosage. Instructions for use (eg take before meal). Patient name, dispensing date. "Keep out of reach and sight of children".” R_United Kingdom_2

Results from the study indicate that in three countries – Netherlands, Sweden and the United Kingdom – it is a common practise to provide patients with pharmacy labels, medication use list and digital information. In all three countries, this information includes patient’s name, instructions for use, the address of the pharmacy and the indication. In addition, pharmacies in the Netherlands and the United Kingdom commonly include warnings and precautions. The date of dispensing the medication is also provided in Sweden and the United Kingdom. Swedish pharmacies further include the prescriber’s name (Table 12). In Netherlands, it is standard practise that upon first dispensing of a new medication, pharmacies add information on a one- or two-page summary about the medicine, also medication guidance information can be provided digitally thorough digital platform called ‘Health Base’.

3.2.10. Information provided on dispensed medication label, providing information digitally and/or providing brochures.

Table 13. Information included on pharmacy labels, provided digitally and/or in brochures in Norway.

Country	Patient name	Medication name	Indication	Use information	Warnings	Dispensing date	Prescriber	Practise	Pharmacy	Pharmacy contact	Other
Norway	✓		✓	✓	✓	✓	✓		✓		✓

“Patient name, indication, dose, way of administration. Extra information if the medication has to be swallowed whole or if it is supposed to dissolve in water before intake. The last part depends on the doctor’s prescription or the pharmacist accuracy in checking and controlling the prescription.” R_Norway_1

“Patient name or the name of the owner of the animal and the species of that animal, Prescriber's name and profession, Date of dispensing, Name of pharmacy, Area of use and instructions for use as stated on the prescription (and if this is not possible, it should be marked "Used as agreed with..." and the prescriber's profession). In addition to this, there must also be additional labelling unless information about storage, shelf life, correct administration method and other necessary things is not already marked on the package (from the manufacturer. Which it usually always is). In addition to this, it must always say For animals or possibly For the animal species in

question, on medicines dispensed for use on animals. In addition to all this, we also have some requirements regarding labelling of warnings. All medicines must be labelled "keep out of reach of children" (which they are from the manufacturer, but if we repackage, for example, we must include this). If a withdrawal period is specified on a prescription from a veterinarian or fish biologist for eggs, milk, honey or meat, the withdrawal period must be applied to the medicine.

If a deadline for starting in competitions is specified on a prescription from a veterinarian, the start deadline must be applied to the medicine. Flammable, explosive or corrosive medicines must be labelled with this (usually comes like this from the manufacturer). And if it is a cytostatic, it should be labelled "Cytostatic" (it comes like this from the manufacturer and is therefore only relevant to us if there is any repackaging, etc.)." R_Norway_2

In Norway, it is a standard practise to provide patients with written medication information through labels attached to drug packages, digital medicine use information, and/or supplementary brochures when these are available and relevant. According to respondents from Norway, it is common to include details like patient's name, medication indication, usage information, prescriber's name and profession, date of dispensing the drug, name of the pharmacy where it was dispensed. In addition, pharmacists are required to provide certain information to patients in written form, typically on the medication label, when a medication has been repackaged in the pharmacy, as these details are normally provided by the manufacturer on the original packaging. This information includes medication storage conditions, the correct administration method, and whether the medication is intended for human or veterinary use (Table 13). Respondent explained that digital medication information is provided through portal called 'Helsenorge' and more information about medications can also be found in platform called 'Felleskatalogen'.

3.2.11. Non-provision of written pharmacy information

In Moldova, no written information is provided to patients in the pharmacy setting, as it is routine practise for prescribing doctors to provide patients with information on medication usage, dose and route of administration in the recommendations. Ukraine reported that sticking a label to the medication package is standard practise, however, they later clarified that this typically involves providing the patient information leaflet or package insert that is legally required to be inserted in all countries. This includes details about the name of the drug, composition, pharmaceutical form, dosage and administration instructions, contraindications, warnings and precautions, adverse effects, overdose management, and storage requirements. Same practise exists in Austria, where written pharmacy information is included in the package. The respondent stated that this package insert

consists of general information about the product. No additional written information is provided by the pharmacist in these countries.

“The doctor prescribes the medication and how often, the dose and route of administration in recommendations.” R_Moldova

“In Ukraine, written pharmacy information typically includes the patient information leaflet or package insert, which is legally required to be included with all registered medicines. It includes: name of the medicine, composition, pharmaceutical form, therapeutic indications, dosage and method of administration, contraindications, warnings and precautions, side effects, overdose information, storage conditions.” R_Ukraine

“General information about the product.” R_Austria

3.3 Specialists’ perception on written information and pharmacy labels

Results indicate that none of the respondents perceived pharmacy labels and written information as a tool enhancing only medication adherence. In contrast 19,2% of respondents considered pharmacy labels and written information as an essential element of the safe use of medicines. Majority (80,8%) of respondents perceived written information as a tool enhancing both the safe use of medicines and medication adherence.

Table 14. Perception on written information and pharmacy labels.

	Responders	
	n	%
Safe medicine use	10	19.2
Medication adherence	0	0.0
Both	42	80.8

*n – number of responders.

3.3.1 Written information as a tool enhancing safe medicine use

Respondents from Austria, Bosnia and Herzegovina, Bulgaria, Germany, Malta, Netherlands, Norway and Spain perceived written pharmacy information and pharmacy labels as a tool enhancing safe medicine use (Table 14). Respondents elaborated on their choice by highlighting how accurate

written information supports safe medication administration, helping to prevent misuse, complications, and side effects.

“Written information could assist in the safe administration of medicines by patients. Sometimes they forget important information - when and how to take the medicines, and before and after meals.” R_Bulgaria_1

“Information about proper use prevents complications and protects against serious side effects.” R_Germany_1

“Information about side effects and possible measures can be lifesaving.” R_Germany_2

“Patients who are using multiple medications or high-risk medications a drug therapy chart is prepared many times by either the hospital pharmacist at discharge or the community pharmacist.” R_Malta

For instance, respondent from the Netherlands elaborated on their choice, adding an example of prior studies showing that adding a label on a package alone do not improve adherence.

“Studies have shown that solely providing information generally does not improve adherence so it is unlikely that a label on a box will improve adherence.” R_Netherlands_2

3.3.2 Written information as a tool enhancing both the safe use of medicines and adherence

Results show that 80,8% of respondents perceived written pharmacy information as an intervention enhancing both the safe use of medicines and medication adherence (Table 14). Respondents from Albania, Croatia and the Netherlands emphasized how strongly connected safe medicine use and medication adherence are.

“I believe written pharmacy information enhances both safe medicine use and medication adherence, as the two are strongly interconnected. Clear, accessible labels and written instructions help prevent misuse, dosing errors, or drug interactions (supporting safety), while also reinforcing correct timing, frequency, and duration of use (supporting adherence). For example, in patients with chronic respiratory diseases like COPD or asthma, specific written instructions on inhaler technique and timing can greatly improve both adherence and treatment outcomes. Including pictograms or QR codes linking to video instructions further strengthens this dual benefit.” R_Albania

“The combination of both functions makes written pharmacy information significantly more effective. It contributes to a more comprehensive understanding of therapy, which can help prevent errors and improve health outcomes.” R_Croatia_1

“I think both are important and related to each other. A patient needs to know and understand how/when to use the medication to ensure safe use but also why it is important to take the medication to support adherence (and what to do when you forget for example).” R_Netherlands_1

Respondents highlighted how written information works as a reminder for patients on how to correctly take the medication and when to take it. This helps to maximize the drug effect and helps to avoid drug interactions, especially in cases when the patient is taking more than a one drug.

“Important information for safety or even maximizing the drug effect and voiding drug interactions (like NSAID after meal, IPP in the morning before meal, bisphosphonates in an empty stomach with lots of water, rivaroxaban with meal, Ferrum apart from other medicines and antacids etc) and the written info is a reminder on the exact time and way of taking enhancing adherence.” R_Croatia_2

“Patients often do not remember how to use particular medicine (especially when using more medicines) and the information written exactly on the package is easily and clearly available at the time they use the medicine. We write the part of a day when medicine should be taken, the frequency of using and the recommendation concerning the use of medicine in relationship with meal. Sometimes even the recommendation of what not to take or do together with the medicine is useful to write on the package (e.g. to avoid some minerals or sunbathing when using doxycycline). Further, the exact time interval for antibiotics can enhance medication adherence of patient as they clearly know when to take the medicine.” R_Czech Republic

“The information provides the instructions on how the medicine should be taken (appropriate use). It helps to ensure safe use but also helps the patient on how and when the medicine should be taken.” R_Finland

“For example if a bisphosphonate has the day of the week the patient normally takes it with the instructions about an empty stomach, upright position etc, this embodies safety and promotes adherence.” R_Ireland

“I feel that the label on the package can contribute to both safe drug use and adherence. I think it is related to safe drug use in that one can see/check what dose has been prescribed, or if there is anything written about the maximum dose in a day. It is also related to compliance in that it can remind the patient that, for example, there are several dosing times in a day or that the dose should be taken with food to avoid stomach-related side effects (which could in turn lead to self-discontinuation).” R_Norway_3

“Written information is the foundation for taking the medication correct, which is important for safe usage and for ensuring medication adherence.” R_Sweden_2

Respondents highlighted the importance of written information in patients with chronic diseases as medication adherence often decreases over time. Written information reminds patients the

importance of the treatment, which might have a positive effect on adherence. According to respondents, written information is very important in older or newly diagnosed patients, as they might often forget how to take their medications correctly. However, a respondent from Sweden expressed concerns regarding the effectiveness of written information for long-term users. Respondents agreed that visuals provided together with written information can enhance medication adherence and safe medicine use across patients with limited health literacy, as it might make it easier to understand the instructions.

“Adherence to medication often decreases in patients with chronic conditions over time. Written information from the pharmacy can help remind patients of the importance of continuing their medication, which may motivate them to stay on track. This is particularly important for preventing abrupt discontinuation of medications like beta-blockers or psychiatric drugs, which can lead to rebound effects, deterioration of health, or relapse of the condition. Clear written guidelines help patients understand the risks and encourage safe, consistent use of their treatment, ultimately supporting both adherence and safety.” R_Slovakia_1

“Clear written instructions (e.g., Take with food to reduce stomach upset) reinforce what the pharmacist explained verbally, especially when patients forget. Visual aids (e.g., a picture of specific timing to show morning vs. evening doses) can help older adults or patients with limited literacy. For chronic diseases (e.g., hypertension, diabetes), consistent reminders in the printed leaflet about the importance of daily adherence help sustain long-term behaviour.” R_Greece_2

“Providing patients with written pharmacy information is a valuable tool for promoting the rational use of medicines, particularly among older adults and individuals starting a new therapy. Clear guidance on dosage, timing of administration, and potential issues can enhance safe medication use and support medication adherence. Infographics, for example, can visually convey when and how to take a medicine, as well as support the correct use of medical devices for drug delivery (such as MDIs and DPIs in chronic inhalation therapies), thereby helping to optimise both treatment effectiveness and medication adherence.” R_Spain_1

“A picture depicting meals, sleeping and other medications taking time, along with the times to take the new medication. in addition, written instructions on how to take the new medication, in an easy-to-understand manner.” R_Spain_4

“Difficult to say, both at least for new users, long term users I don't know the impact on. Depends on what information you mean by written. Patients can digitally see their medicines they use on various pharmacy chains platforms, they can get a list for overview from the pharmacy, they get basic information on the labels. But we normally don't send individualized information digitally to the patients, e.g. information we give during dispensing.” R_Sweden_1

A respondent from Romania questioned the effectiveness of written information in reducing medication-related risks and improving medication adherence, emphasizing the absence of medication adherence measurements in their country.

“To my knowledge, in most cases, the pharmacist writes information by hand on the product package, usually the dosage and posology. They are, but limited and according to personnel and available time, pharmacies where a more comprehensive information label can be provided to the patient. This written information may support the appropriate administration of medicines: appropriate dosage, appropriate interval between doses, appropriate duration of treatment, with or without meal. This practice can reduce the risk of adverse drug reactions (potentially from overdosage or underdosage, lower/higher interval between doses, shorter or longer duration of treatment). Medication adherence can be supported through the readily information available directly on the package, especially for patients who find it difficult to comprehend the extensive information provided during medical consultation or the one available in the SmPC (e.g. elderly). However, I believe that the benefits of written pharmacy information in minimizing drug risks and increasing medication adherence remain limited, with no solid measurement available yet in Romania.” R_Romania

The remaining answers demonstrated the importance of written information in patient safety and adherence, as it provides clear instructions on how to take the medication in a correct and safe way. A respondent from Ukraine highlighted that patients’ confidence in their medication safety increases the likelihood of adherence to the prescribed regimen.

“Both for safe medicine use as well as to increase medication adherence.” R_Cyprus

“I can see that it would help enhance safe medication use as well as medication adherence - an adherent patient has less safety risks regarding medications.” R_Estonia

“Indicating the daily frequency of use on the medication package facilitates patient adherence. It doesn't matter whether it's handwritten or labelled.” R_Turkey_2

“Written information in language that a patient or carer understands brings empowerment and thus improve knowledge and thus better adherence to medicines.” R_United Kingdom_1

“These labels are vital for patients and carers to understand what the medicine is, how it should be used, both equally important.” R_United Kingdom_4

“Safe medicine use is foundational. It includes understanding dosing, interactions, contraindications, and side effects all critical for preventing harm. Medication adherence depends on safety: people are more likely to take medicines correctly if they understand and trust that the medicine is safe for them.” R_Ukraine

3.4 Legal requirements

Although respondents from 16 countries have answered that there are legal requirements on written information in their countries, after further research it was indicated that only 10 countries have legally mandated requirements specifying the information that must be provided to patients in written form. A review of legislation was conducted for all participating countries, including those in which participants reported no existing legal requirements on written information. After the review, 10 countries remained eligible for inclusion in the legal requirements analysis: Denmark, Finland, Germany, Hungary, Iceland, Ireland, Netherlands, Norway, Sweden and United Kingdom. This shows that some respondents did not understand the question correctly. The most common requirements are to specify patient name, instructions on how to use medicine and pharmacy name, where the drug was dispensed. In some countries, it is also mandatory to include additional information, such as the price of the drug, the validity of the prescription, the remaining quantity of medication and the pharmacist's name.

Table 15. Legal requirements on written information/pharmacy label provision across countries.

		n
Information that is legally required to be provided to the patient in the written form (10 countries)	Patient name and (or) surname	9
	Indication	5
	Instruction on how to use medicine	9
	Cautions and restrictions	3
	Prescribing doctor's name and surname	4
	Practise name where the medicine was prescribed	2
	Pharmacy name where the medicine was dispensed	8
	Pharmacy contact information	4
	Other	6

*n – number of countries.

In Denmark, the Prescription Order mandates specific labelling rules for dosing containers used to dispense medicines. These ensure patient safety and traceability, when the medicine is disposed for the patient. According to section 118 of *BEK no. 827 of 24/06/2024 Execution on prescriptions and dosage dispensing of medicinal products*, labels must include the drug's name, strength, dosage form, usage instructions, batch control number, expiration date, and the name of the dispensing pharmacy. For certain patients, like hospital patients or specified individuals, the label must also include the patients name, civil registration number, and scheduled intake time. Shortened

forms are permitted for lengthy text if they remain clear, with the text at least 7 didot points in size. (60)

In Finland, it is a standard practise to provide patients with pharmacy labels, when dispensing medication. The labels include information like patient name, dispensing date, medication name, strength, quantity dispensed, indication, use information, pharmacy name and contacts. Additionally, the price of the medication, the remaining quantity prescribed, and the validity period of the prescription are included. Finnish Medicines Agency Normative Guideline states that manufacturers packaging has to leave space for the pharmacy's prescription labels. The space has to be marked with lines or text, that it is designed for pharmacy labels '*the space for the label should be marked clearly with lines or indicated with text (for example "Apteekin ohjelipulle / För apoteketiketten")*'. (61)

In Germany, information like patient name, indication, instruction on how to use medicine, cautions and restrictions, prescribing doctor's name, practise where the medicine was prescribed, pharmacy where the medicine was dispensed and pharmacy contact information are legally required to be provided to the patient in the written form, usually by sticking a label directly on the package. These requirements are stated in the section 14 of *Regulation on the Operations of Pharmacies (Pharmacy Operating Regulations – ApBetrO)*. (62) Additional information can be provided by writing details directly on the package or providing patients with medicine use list. No legal requirements exist for additional information.

In Hungary, the provision of written pharmacy information is regulated by legal requirements. According to *Ministry of Health Professional Directive (EüK 2024/9)*, during all counselling sessions, patients' attention should be drawn to the patient information leaflet included in the medicine package. During the consultation, the pharmacist is also required to provide the patient with the patient information leaflet for the medication, in either written or electronic form, and to inform the patient that they can contact the pharmacy later if any information remains unclear. Pharmacists are highly recommended to provide patients with medicine use table, which includes all relevant information for the patient.

In Iceland, the legislation mandates specific pharmacy labelling rules, when dispensing prescription medication to patients. Labels must include information such as patient name, indication, usage instructions, prescribing doctor's contacts and name of the practise place, pharmacy name where the medicine was dispensed, and the date of dispensing. Good pharmacy practise guidance found in the *Icelandic Medicines Agency (Lyffjastofnun)* requires pharmacists to ensure patients with clear medication use instructions, safety warnings and traceability of dispensing. Pharmacy labels ensure that patients are provided with this information. (63)

In Ireland, the patient's name, instructions for use, and the pharmacy's contact information are required to be provided in written form, when medication is dispensed. According to *S.I. No.*

540/2003 - *Medicinal Products (Prescription and Control of Supply) Regulations 2003*, this information has to be included in a label and placed directly on the medication package. (64)

In the Netherlands, pharmacists must provide patients with written information on dispensed medication label, medicine use list and/or on a digital platform. There is no single Dutch legal document that lists all the legal requirements. These requirements are derived from Article 54 from *Directive 2001/83/ec* of the European parliament and of the council and Policy document *MEB-6 Labelling of pharmaceutical products* from Medicine evaluation board. EU law requires written instructions on the outer packaging of medicinal products or, where is no outer packaging, on the immediate packaging. It states that labelling is intended for the patient. Policy document from Medicine evaluation board states that labelling must comply with EU directive. Also, section 21 in the Royal Dutch Pharmacists Association guideline *Ter hand stellen* states that pharmacist applies their product knowledge to properly inform the patient and includes relevant information and warnings on the packaging by small stickers or additional text on the label. It is a common practise to print dispensing labels and stick them on the package, with easily accessible and understandable information for the patient. The labels include information about patient name, instructions on how to use medicine, cautions and restrictions, pharmacy name where the medicine was dispensed, dosage and administration route, if different than oral. (65,66)

In Norway, legislation requirements in pharmacy labels are found in chapter 12 *Labelling when dispensing medicinal products* in the legal document *Regulations on the requisition and dispensing of medicinal products from pharmacies*. According to the requirements, prescription medicines must be labelled with patient name, date of dispensing, the name of the pharmacy, indication, instructions on how to use the medication, prescribers' information. The receipt from pharmacy must be attached, unless cases when the considerations of the safe dispatch can be documented in another way. The dispensing regulations do not require the patients age to be stated on the label, but the practise shows that the age of children and young adults under 16 is still stated on the label. For children under 2 years old, the age is stated in months. This is the standard in the IT systems of pharmacies and is automatically stated on the labels. (67)

In Sweden, mandatory dispensing labels includes patient name, instructions how to use medicine, prescriber, pharmacy name where the drug was dispensed, date of dispensing. Indication of the medication should be included also, but in practise it is not always included. (68)

In the United Kingdom, Schedule 25 of the *Human Medicines Regulations* states labelling requirements for prescription medicines. It is a legal requirement to include information like patient name, instructions on how to use medicine, cautions and restrictions, pharmacy name and contacts where the medicine was dispensed. (69)

3.5 Analysis of pharmacy labels and written information

Respondents from 12 countries have provided pharmacy labels and written information examples from their countries. These examples offer insights into how written information is provided to patients across different healthcare systems. The collected examples reveal variations in content, format and symbols. The analysis revealed that the most reported elements on written information were use information, medication name, strength, quantity dispensed and pharmacy name. Additional information, such as pharmacists or prescribers' details were reported less consistently and varied between countries.

Overall, the findings indicate both similarities and differences in the content of pharmacy labels, reflecting variation in labelling practises across different countries. A structured comparison of these similarities and differences by country are presented in Table 16.

To further illustrate these findings, examples of pharmacy labels and written information are analysed individually to demonstrate how these informational elements appear in practise.

Table 16. Pharmacy label/written information content elements across countries.

	Bulgaria	Estonia	Finland	Greece	Hungary	Ireland	Lithuania	Netherlands	Romania	Sweden	Turkey	United Kingdom
Patient name		✓	✓				✓	✓	✓	✓		
Dispensing date			✓	✓		✓		✓	✓	✓	✓	✓
Medication name		✓	✓	✓	✓	✓		✓	✓		✓	✓
Medication strength		✓	✓	✓	✓	✓		✓	✓		✓	✓
Quantity dispensed		✓	✓	✓		✓		✓	✓	✓	✓	✓
Indication			✓		✓		✓		✓	✓	✓	
Use information	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Warnings						✓			✓		✓	✓
Pharmacy name		✓	✓	✓		✓	✓	✓	✓	✓		✓
Pharmacy contacts		✓	✓	✓		✓		✓	✓		✓	✓
Pharmacist						✓		✓	✓		✓	✓
Prescriber		✓							✓	✓		
Other		✓	✓		✓		✓	✓	✓	✓		

The study results indicate that, in Bulgaria, written instructions for medication use information are provided to patients by handwriting directly on the medication packaging (Fig. 6). While this enables personalized guidance, the handwritten nature introduces variability in clarity and may compromise patient comprehension, safe medicine use and adherence. The medication name and strength are printed on the package by original manufacturer.



Figure 6. Examples of written information provided to patients in Bulgaria.

Example demonstrates that, in Estonia, pharmacy labels provided to patients include patient name, medication name, strength, quantity dispensed, use information, pharmacy name and contact information, prescribers' name and phone number (Fig. 7). The standard is a printed label, presented in a clear black-on-white format, enhancing readability and ensuring consistency of instructions, reducing the potential for misinterpretation, but it can vary across different pharmacies. No symbols or pictograms are incorporated in labels.

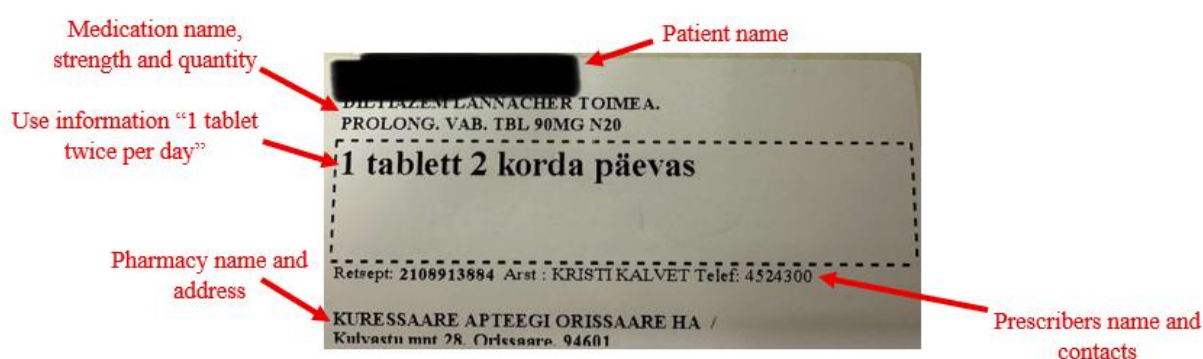


Figure 7. Example of pharmacy label provided to patients in Estonia.

The results reveal that, in Finland, it is a common practise to provide patients with written information in printed pharmacy labels. The content of the label includes patient name, dispensing date, medication name, strength, quantity dispensed, indication, use information, pharmacy name and contacts. Additionally, the price of the medication, the remaining quantity prescribed, and the validity period of the prescription are included. No symbols or pictograms are included in the labels, only clear black-on-white instructions.

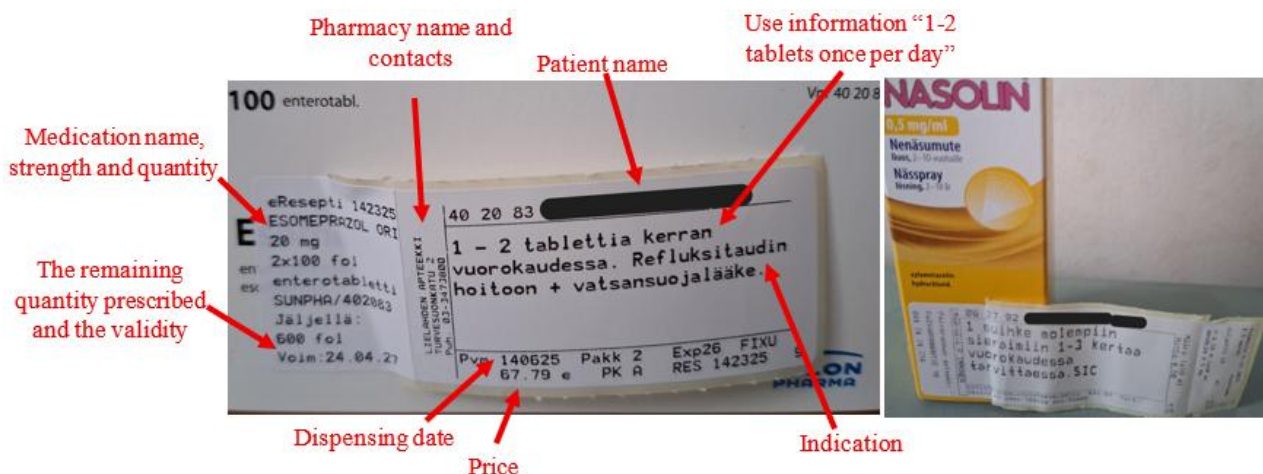


Figure 8. Examples of pharmacy labels provided to patients in Finland.

The findings of the study show that in Greece medication name, strength, dispensing date, quantity dispensed, use information, pharmacy name and contacts are provided in pharmacy labels. The standard label is presented without symbols or pictograms and includes only text, but it can vary across different pharmacies. The pharmacist sticks the label directly on the medication package.

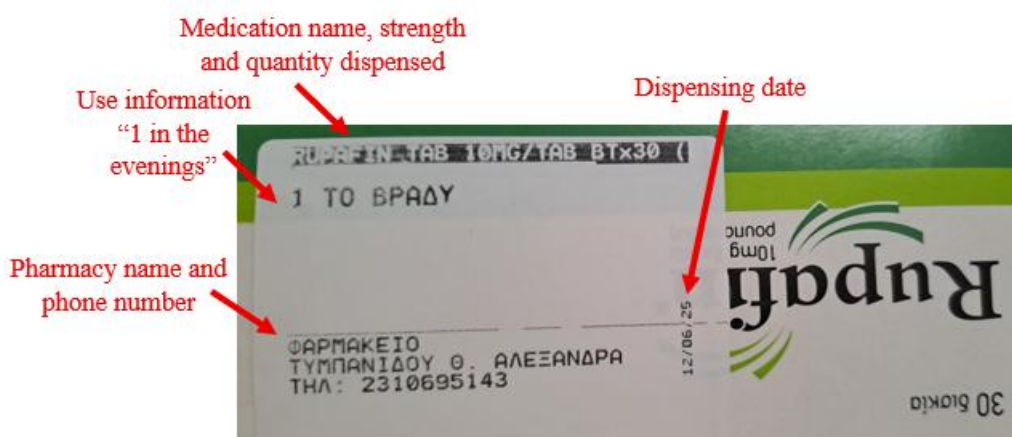


Figure 9. Example of pharmacy label provided to patients in Greece.

It is a recommended practise, in Hungary, to provide patients with a medication overview table during medication review conducted in the pharmacy. This table is optional and is not completed routinely, but highly recommended. It includes medication name, strength, indication and detailed use instructions, including separate space for the prescribed dose and dosing frequency, the timing of administration and specific use instructions (e.g. before/after meals, etc.). No special symbols, pictograms or colours are used in this table.

What? Medication name and strength	Why? Indication	How much? Dosing frequency	When? Timing of administration	How? Specific use information
MIT? gyógyszerem neve és erőssége (pl. mg, µg, NE)	MIÉRT? ez a gyógyszer erre való	MENNYIT? mennyiség és gyakoriság (pl. 2 tableta naponta)	MIKOR? (pl. R:1 és E:1)	MIKÉNT? (pl. étkezés előtt, egészenben lenyelni stb.)

Figure 10. Example of written information provided to patients in Hungary.

Content analysis shows that pharmacy labels in Ireland contain information like dispensing date, name, strength and quantity of the dispensed medicine, use instructions, warnings, pharmacy name and contacts where the drug was dispensed and it can also include pharmacists name. The pharmacist sticks the label directly on the medication package.

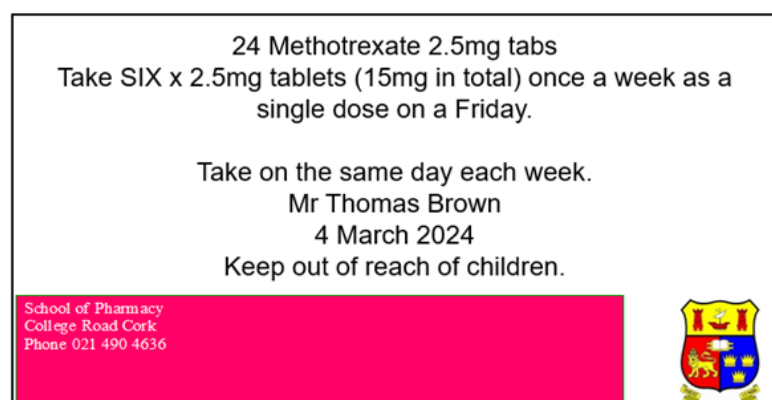


Figure 11. Example of pharmacy label provided to patients in Ireland.

Pharmacy labels used in Lithuania vary across different pharmacy chains, as there are no legal requirements on written information. It can contain different information like the patients name, indication, instructions on how to use the medicine and pharmacy name, where the drug was dispensed. The pharmacist sticks the label directly on the medication package. Some labels use pictograms to visualize the time of the day, when the drug should be used. Others also include separate space to mark how the medication should be taken regarding meals. Also, the labels can contain some space for additional comments.



Figure 12. Examples of pharmacy labels provided to patients in Lithuania.

The results reveal that, in the Netherlands, it is a common practise to provide patients with written information in printed pharmacy labels. The content of the label includes patient name, dispensing date, medication name, strength and quantity dispensed, use information, pharmacist name and the name and contact information of the pharmacy where the medication was dispensed. Additionally, patient date of birth is included in the label. No symbols or pictograms are incorporated in labels.



Figure 13. Example of pharmacy label provided to patients in Netherlands.

The example illustrates that in Romania written information provided to patients include very detailed information about their treatment. It is not mandatory to provide patients with written information, but highly recommended. Written information includes patient name, dispensing date, name, strength and quantity of dispensed medication, indication, use information, warnings, pharmacy name, contacts, pharmacist and prescriber details. Also, there is separate space for daytime, when the medication should be taken and observations.

Patient name →

Indication →

Prescriber →

Pharmacist →

Medication information →

Time of the day →

Special warnings →

Pharmacy name and contact information →

Dispensing date →

Observations →

PROGRAM DE TRATAMENT

Vă recomandăm să prezentați această schemă de tratament la fiecare consultație și la farmacie.

FARMACIA ELFA

Nume, prenume pacient: _____

Diagnostic: _____

Medic prescriptor: _____

Farmacist: _____

Data: _____

Trăiește sănătos!

Te îndrumăm spre sănătate!

Str. Romașca nr. 17, București

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Web: www.elfa.ro

	Medicament	Dimineață	Prânz	Seară	Observații
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Vă rugăm ca orice reacție nedorită aparută la medicamente să o comunicați medicului și farmacistului.

Figure 14. Example of written information provided to patients in Romania.

It is a common practise to provide patients with written information by sticking a label directly on the medication package in Sweden. The label includes information like patient's name, dispensing date and quantity dispensed, indication, use information, pharmacy name and prescribers' information. It can also include price of the medication and patients date of birth. No symbols or pictograms are incorporated in labels.

The diagram shows a box of Sumatriptan Accord 50 mg film-coated tablets. Red arrows point to specific fields for data extraction:

- Patient name:** Points to the empty space at the top left of the box.
- Pharmacy address:** Points to the blue horizontal band across the middle of the box.
- Use information:** Points to the text "1 tablett vid behov 1 gång per dagligen tills vidare" (1 tablet when needed 1 time daily until further notice).
- Pharmacy name:** Points to the "APOTEK" logo and name on the right side of the box.
- Quantity dispensed:** Points to the handwritten number "1" next to the text "1 tablett vid behov 1 gång per dagligen tills vidare".
- Dispensing date:** Points to the date "2021-01-10" printed on the right side of the box.
- Prescriber:** Points to the handwritten signature of the prescriber on the right side of the box.

Figure 15. Example of pharmacy label provided to patients in Sweden.

Label example from Turkey demonstrates that labels provided to patients include dispensing date, medication name, strength and quantity dispensed, indication, use instructions, warnings, pharmacy contacts and pharmacists' name. Also, it can include information about the price of the medication. This is just an example of what information is included in the labels, the layout and colours in practise are different.

The diagram shows a sample receipt from a pharmacy. Red arrows point from labels to specific fields on the receipt:

- Medication name and strength** points to the top line: (1) CIPRO 500 MG 14 FILM KAPL...
- Dispensing date** points to the date: 13.08.2025
- Use information** points to the usage instructions: SABAH AKŞAM (12 SAAT ARAYLA) 1 TANE AÇ VEYA TOK KARNINA BOL SU İLE YUTULACAK
- Indication** points to the text: ANTİBİYOTİK - İDRAR YOLU İLTIHABI
- Special warnings** points to the paragraph of text: Her gün aynı saatte ve düzenli kullanılmalıdır. Demir, magnezyum, kalsiyum, alüminyum, kalsiyum içeren ilaçlardan ve süt ürünlerinden 1-2 saat önce veya bunlardan en az 4 saat sonra verilmelidir. Süt ve süt ürünleriyle beraber kullanmayınız
- Price** points to the price: 1148.NakitSatis
- Pharmacists name and contact information** points to the bottom line: KOLAY ASİSTAN ECZANESİ / 0850 305 25 40

The receipt also includes a **BİTİŞ TARİHİ** (Expiration Date) field.

Figure 16. Example of pharmacy label provided to patients in Turkey.

The study findings indicate that in the United Kingdom it is a common practise for pharmacists to stick a label directly on the medication package. Pharmacy labels include information about medication dispensing date, name, strength, quantity dispensed, use information, warnings, pharmacy name and contacts where the medication was dispensed and pharmacists' information. The standard label is presented without symbols or pictograms and includes only text.



Figure 17. Example of pharmacy label provided to patients in the United Kingdom.

3.6 Lithuanian pharmacists perspective on pharmacy labels and written information

Five pharmacists participated in online focus group discussion on April 16 via MS Teams. Three pharmacists were working in Vilnius, one in Mažeikiai, and one in Alytus. Three pharmacists had over 15 years of professional experience in pharmacy.

Table 17. Sociodemographic and professional characteristics of the participants.

Initials	Gender	Age	Years of practise	City of practise	Number of patients per day in a pharmacy
AL	Female	18-29	1	Vilnius	300-400
LS	Female	50+	20+	Vilnius	150-200
ME	Male	30-39	15	Mažeikiai	200-300
RM	Female	30-39	15	Vilnius	200-250
ŠJ	Male	18-29	3	Alytus	100

3.6.1 Providing written information

This part of the focus group discussion was to identify how the participants provide written information to patients, what tools they use, what elements are the most important and their perception on written information.

All five participants explained that they try to always provide written information when dispensing medication. The most often used methods are writing directly on the medication package or sticking a label. One participant highlighted that sometimes handwritten information may be hard for the patients to understand.

ME: *"We usually provide, but we write on the box itself with a pen brief information: frequency of use, if food is relevant, morning or evening, this information and, of course, the indication. We also have stickers, but we stick them less often, because there is not much space on them."*

RM: *"I would definitely agree, I probably also always try to write everything down, because in reality, even if a person repeats that they know they are using it, it happens that the same patient comes back a month or three later and then you find out that they don't know, it just seems that way to them at the time or they want it to end faster, so we also write it down."*

LS: *"We always ask the patient first if they need information. Because as our colleagues said, others have been using it for a long time and know everything and either, let's say, they prescribed one antibiotic, the patient says I know everything, no need, well, then we don't write anything or we just write, let's say, one on the box three times a day after meals and that's it. Every person has their own handwriting, just like we don't always understand what the doctor writes, it is hard to read. So when you're standing and writing quickly, sometimes you can't write it beautifully, and sometimes customers come from other pharmacies and bring packages, because they can't read what's written on it. Well, let's say, for pain or something, even if it's just a few words, they can't read it."*

One participant highlighted that written information is necessary for older patients starting new medication, and those with dementia.

ŠJ: *"In most cases, it is necessary to write on the boxes for older people, exceptions are only in the case when an older person has been taking medication, especially if it has been reimbursed for a longer period. They simply say do not write anything here, I do not need anything. For younger people, it is also rarer, unless they have already seen some of the medications. Usually, it is enough to say orally, but another exception is medications for dementia. People who have problems with memory, they really need us to write. I try to write on the packaging, other packages are very inconvenient to write on, so I use the stickers provided by the pharmacy, which are also not convenient in every case."*

Two participants emphasized that the method of providing written information often depends on the size and colour of the medicine package. In cases when the medication package is smaller or more colourful, it is easier to stick a label.

AL: *"I usually write on the packaging itself, and we also have those stickers, so I use stickers more often if the box is very colourful or small and there simply isn't enough space to write on the box itself. That's when I usually use stickers."*

ME: *"I also wanted to add that it really depends on the medicine packaging which method you choose, because if it's a dark package and you can't write with pen on it, then you should definitely think about something else."*

One participant highlighted that symbols used in labels are very convenient when dispensing medication for foreigners, as it makes it easier for them to understand.

LS: *"We stick labels on them, they work better if someone comes who doesn't understand Lithuanian, let's say, they also need to be assigned, then all those little suns and moons and half-days, and those symbols really do it. It's really good, because numbers are just numbers, but when you mark them there with all those little suns and moons, it's clearer to them."*

Pharmacists explained that written information is sometimes not provided, either due to lack of time or because the patient declines it.

ME: *"Well, of course, if you work alone and don't have time, and the patient is familiar with the medications, there are cases when we don't write them down simply due to lack of time because we can't keep up with everything."*

AL: *"I usually try to write everywhere, unless the patient really refuses and says, 'I don't need anything, you can leave it at that'. Well, then I don't write so compulsively."*

All pharmacists agreed that the labels available in pharmacies for providing written information are not the most user-friendly. They emphasized the lack of space on the labels and the inconvenient design.

ME: *"I'm not very satisfied with their design."*

ŠJ: *"Sometimes there is not enough space, especially for explanations, if there are some special indications that you cannot take something together, but in most cases, I try to write it down and that is probably all."*

RM: *"Most of the time, my colleagues and I write on the packaging because stickers are inconvenient."*

LS: *"The stickers are really small and you can't write much information on them."*

Pharmacists expressed the need for compact labels, that would come in different sizes and could fit different types of medication packages.

ME: *"When it comes to label size, it's one thing, I think there could be different sizes to choose from."*

One pharmacist stated that the written information should be provided by printed labels, not writing it by hand, as this would make it even easier for the patient to understand. This method would

also save time for pharmacists, as it takes time to write detailed information by hand. Other participant emphasized on that stating that the handwritten information is not always easy to understand and agreed on the need for a printed label.

ME: *“So I think we should move away from written labels and switch to automated computer-printed labels. To get information to the label through the program from the prescription. After that, the pharmacist would evaluate it, supplement it and then print it and stick it, because that handwritten writing really takes a lot of time and the legibility of the writing is not of the same quality as all pharmacists and so on, and I think that today all the technical possibilities are there, it's probably just that there is a lack of some will to implement it and invest in it.”*

RM: *“Patients bring it from other pharmacies and if it's written in an unclear way, they have questions about how to interpret it, and it seems like everything is clear when you write it, but for that patient, everyone evaluates it from the other side.”*

“And if, as ME just mentioned, a label were printed immediately, because now if a pharmacist, would start writing by hand everything like this, first name, last name, then what the medicine is from, how much, then the duration would also be extended, and there would be dissatisfaction. But if the computer immediately printed the label, all that remained was to be added, corrected, then this would be a very, very good thing I think.”

Two pharmacists are using their own made templates to provide patients with written information.

ME: *“I have made a few templates myself. For more complex cases, for example, how to mix paracetamol or ibuprofen for babies, I have made templates and print them out, then I give the sheets. When there are more complex cases, I usually use those templates. If I have more time, then I also just write down the information specifically for that patient and print it out.”*

RM: *“We have printed out such sheets, so sometimes for those polypharmacy patients, if they don't have one from the doctor, usually now it's already a good practice that doctors come with all that information, a table, when to take it. It's really very convenient, especially for the elderly, so I just have such a printed table, then we write by hand on the table itself which medicine is indicated for lunch, morning, evening and it becomes a little clearer for that patient.”*

Pharmacists expressed their perception on written information as the tool enhancing both the safe medicine use and the medication adherence. They emphasized the importance of written information for correct and safe medication usage, especially in cases when the medication therapy is more complex.

LS: *“Definitely medication adherence. Because when one medicine is one, but when it comes with many medicines and their use is varied. It's about the elderly, we should talk about it here, although they think they know everything, but as far as I know from experience from my relatives and*

everything else, well, they say in the kitchen that they put all the boxes on the table, they themselves divide. It's also good and when you list everything, it's up to the person who is responsible for that patient. Let's say a son or daughter, they sort the medicines, put them in boxes for them and it's better for them to orient themselves, where which pills are and how to put them. Again, safety is the same, safety is also important, because when a patient takes that box, if you even briefly write down for pain so whether it's if he has pain, he probably won't take the blood pressure medicine. Well, as for safe use, the information is already there. No need to pull from the inner leaflet, let's say so. So that writing of that additional information provides both safety and use, as well as the medication adherence.”

RM: “I would also add about safety. I think it is very important here, where in other countries they immediately write on the printed labels which patient it is for. Well, the patient's name and surname appear on the medicine, it seems like redundant information, but in fact I think not, because I have encountered the fact that seniors of respectable age mix up medicines because some medicines are the same, some are in different doses. The worst thing is when they say that put everything in one bag, I say, how will you tell the difference, so I write initials on the packages.”

ME: “And one should also not forget about situations where there is a scheme of use. There is a high probability that the patient will not remember that after a week he has to change the frequency of use.”

AL: “I agree with all the thoughts expressed.”

3.6.2 Written information practise in foreign countries

This part of the focus group discussion was dedicated to discussing written information examples used in Bulgaria, Estonia, Finland and Romania. Pharmacists expressed their thoughts, observations and insights about the labels used abroad, their content and clarity.

First example of written information shown was from Bulgaria (Fig.6). Pharmacists agreed that this is very familiar, but not the best way of providing written information. Handwritten information can be interpreted differently, especially if the person who is buying medication is not the one, who will be taking it.

ME: “This is of course familiar. We do it too, but mostly, as we said, due to lack of time. I think it's very clear to all of us because we know the medications, I wonder if it would be equally clear to patients.”

RM: “Yes, yes, that's why I say that patients really have a lot of questions, because sometimes you don't understand that their knowledge is completely different and they see things differently. They look at that package as if it were the first time and try to understand something. So again, well, but I

say, this is probably a very good thing that worked, if you tell the patient and write it down at that time, then everything is fine, but if it's not the medicine intended for that patient, maybe he brings it back to his wife and takes a box of medication X and interpret it. He will say, I don't remember anything, they said, but I forgot until I got back and then they'll try to interpret it and try to figure out whether, here, she should take three or something. Well, here again, those interpretations can arise, people can invent everything, so here and there are also sometimes such variants, where I say, you wouldn't even think of it."

LS: *"Well, as an example, with medication X, three times a day written, but we write one capsule three times a day, but vice versa, so here too, how to understand."*

Pharmacists expressed a positive attitude towards the label example from Estonia (Fig. 7). All the contents included in the label seemed relevant and needed, except physician's name and contact information. Pharmacists disagreed at first – about whether it would be possible to write this information on the label, due to personal data, but they agreed that providing only the name and surname of the physician would be the best practice.

ME: *"The fact that we want such a label is probably the main idea."*

LS: *"Everything is fine here, but with doctor contact details, it's not possible here."*

"Well, now I'm thinking, is it possible to write the doctor's name and surname? Again, that data protection thing..."

ME: *"Well, it is possible to not write their phone number, but write their name and surname and the patient will already know which doctor prescribed it to them and if they have a question, they would know, then they would look for them at the clinic and call them. So I see that in reality, all the information is here, as I said at the very beginning, so that everything could come from the e-prescription and with the click of a button, we could print it and stick it on."*

AL: *"Yes, I'm somehow noticing more and more often that sometimes patients even sort the prescribed medications, if I may say so, by doctor "- So today, give me the one that the neurologist prescribed for me, and the other one that the family doctor prescribed for me". I think that would also somehow contribute to, maybe a better understanding of what those medications are for, for what reason they were prescribed. I just don't know if that contact information would help or not, but I think writing the doctor's name who prescribed has advantages."*

ŠJ: *"I will also agree that I think that writing the doctor's name on the label would really be useful. The contact number, first, it would be very difficult to find, and another thing is that it is difficult for us to contact doctors, to reach them, so I don't know if it would be even easier for patients. So that number would not matter, but what could be written is the position or some specialization of the doctor."*

Participants also discussed whether patients would like to have their names on the medication packages, especially if the medicine is for cases like depression. One pharmacist suggested a solution that printing the name of the patient could be optional.

ME: *“Well, it's not a very complicated solution here. If we have several drugs that are sensitive to this information, then you can simply program it so that the patient gives consent whether to indicate or not to indicate, and that's it. I don't think there is something technically very complicated here.”*

The label example from Finland (Fig. 8) seemed less clear than the Estonian label due to its format and amount of information included. Pharmacists agreed that the price of the medication is irrelevant information, as it varies over time.

ME: *“The amount of information is probably good. Maybe there is more than it should be, but, for example, the layout and the label itself are absolutely unclear to me. Compared to the previous Estonian one, we could already understand what is written there and why, what information, what it indicates without explanation. It is clear, where is the price, where is the active ingredient, here is something else here, well, it is so difficult for me to understand at first glance, it is the structure itself, I don't really like this label.”*

LS: *“I think there's a bit of excess information here about what the price is. Well, today the price is the same, tomorrow it will be different.”*

RM: *“That arrangement isn't very clear, it would be harder for me to understand everything.”*

ME: *“The medicine is enough until date would be very convenient to have on the label”.*

ŠJ: *“Of course, maybe adjust the information a little for clarity, make the sticker not horizontal, but vertical, so that the specific information is indicated in lines, then maybe it would be even clearer. As for the price, I also agree that it is a very irrelevant information here, because it can vary.”*

Example of a patient card from Romania (Fig. 14) seemed like a good tool to provide patients with their treatment details, but it takes too much time to fill out. For this reason, pharmacists did not think it would be very convenient, unless it were printed out.

ME: *“The card is very good, but it is very time-consuming to write it down. So, for example, if I go back to the same thing, I want to automate everything, if it can be printed out automatically, even if it is not a card, but a simple sheet of paper with a list of all the medications with that information, that would be great, but writing down the names of all the medications by hand on one sheet of paper is very time-consuming to fill out.”*

LS: *“This is a big consumption of time, and the patients are impatient.”*

RM: *“I would also agree that the option here might not be bad, but these days, it really takes time.”*

AL: *“I would say that there is potential, but it needs to be adjusted, and if it could be automated, that would be great.”*

All five pharmacists agreed that the most appropriate and understandable written information example was from Estonia, due to the amount of information and its convenient format.

ME: *“I liked Estonian the most.”*

3.6.3 Adaptation of foreign practises and label standardization in Lithuania

All pharmacists agreed that there should be standardized pharmacy labels in all pharmacy chains. One pharmacist suggested that there could be two standardized labels one for prescription medicines with more information and the other with less information.

ME: *“I think we would all agree that there should be a standard one and that those labels should be mandatory in all pharmacies. There should probably be a deeper discussion about the information, because there are things to discuss. Well, but the most important thing is probably the name of the medicine, of course, although if there is a name on the box, then it is probably not necessary, the indication would be more important on the sticker, then the use information and how we just decided that we should have that additional information about the remaining medicines from the prescription, when the medicines ends, the contact information of the doctor and the pharmacy. I think that the patient's name is also needed, well, at the beginning of the discussion we also decided that it would be useful. Sometimes it happens when mothers in particular buy medicines for two children and similar situations.”*

LS: *“It would be possible to have two versions of labels, let's say. For reimbursed drugs with all the information, and for others, for simpler use, with less information. So, I think that would be suitable.”*

Pharmacists identified a few challenges that would come with label standardization in the country. Currently there is a lack of initiative and the process would take a lot of time and discussions. Participants also explained that a negative attitude may come from some pharmacists who are resistant to innovations, as well as from the business side, since these legal changes and printing would cost and those costs would most likely have to be covered by the pharmacies themselves.

ME: *“If you talk about standardization, then it cannot occur in any other way than through a legal basis. And who can initiate it, any person or organization can. You need to write appeals to the ministry and. With an appeal that such a change is relevant and if they would be willing.”*

LS: *“There would definitely be and would be very long discussions, because that is very common here.”*

MS: *“Resistance would come from two sides. I think it is clear, first, that there is a part of pharmacists, as in all areas, who do not want any innovations, and they accept every innovation as some kind of bad thing and resist it. That is why there is another part, that the fact of printing a label means additional costs. The Ministry of Health does not cover those costs for pharmacies.”*

Overall, all participants of the focus group discussion expressed the need for clear and standardized written information, as it is essential for the safety of the patients and achieving successful medication outcomes. They highlighted the importance of written information for vulnerable groups, including older patients and those starting new medications or experiencing memory related conditions. Challenges of the implementation of a standard label were also identified by the participants like negative attitudes, time and price of the process. Despite these challenges, there were a clear consensus that improving access to understandable written information would enhance patient understanding, safety and support medication adherence.

4. GENERAL DISCUSSION

This study has identified pharmacy labels and written information use in practise, legal requirements and specialists' perception in 32 countries. Several similarities and differences have been observed between countries included in the study.

The study findings demonstrate that in most of the countries written information is provided to patients using more than one method and the most common practise is to stick a label, write the information directly on the package or use the combination of these two methods. In contrast, 9,4% (n=3) countries no written information is provided at all. In the existing scientific literature, no works have been observed that examine written information provision differences across a large number of countries. Yet, in regional and national studies, an emerging consensus for communicating less confusing, more informative and safer information on dispensing labels was observed in the last decade. (70,71)

No specialists perceived written information as a tool enhancing safe medicine use only. The majority of participants perceived written information as an intervention enhancing both medication adherence and safe medicine use. Vitor and Cavaco showed similar results in community pharmacists' attitudes toward written information as possible contributing factor to better medication adherence and patient health protection.(72) This is also supported by study of Wolf et al. where patients receiving the patient-centered labels demonstrated slightly better proper use of their drug regimens. (73) However, a different pharmacists perception was seen in a qualitative study conducted by Hamrosi et al. where fear that written information, specifically side-effects, may have a negative impact on medicines use and medication adherence, was expressed. This might explain, why some specialists might hesitate to provide detailed information in a written form. (74)

Study results show that 10 countries included in this study have legally mandated requirements specifying the information that must be provided to patients in a written form. Analysis of legal requirements demonstrated that the most common requirements are to include instructions on how to use medicine, the patient and the pharmacy name where the medication was dispensed. In the existing scientific literature, no research has been found that would compare legal requirements of pharmacy labels and written information across countries. Most of the studies compare international regulations for written medicine information included in the medication package across different continents. (75) Package inserts are mandatory by regulations and must be included with all medication packages across European countries; therefore, this type of written information was not analysed in this study.

Analysis of 12 pharmacy labels and written information examples revealed both similarities and differences across countries. All 12 examples revealed that a standard practise is to provide

medication use information in a written form. 75% of examples provided information about medication name, strength, quantity dispensed and pharmacy name where the medication was dispensed. Similarly, 67% of examples provided pharmacy contact information and address, where the medication was dispensed. Samaranayake et al. highlighted the problem of a lack of standardization when providing written information in the pharmacies. (76) Only Lithuanian pharmacy examples had symbols and pictograms in the labels. Study by Yin et al. shows that use of pictograms improves medication use among low-literate adult caregivers of paediatric patients. (77) On the other hand, Dowse et al. explains that potential on misinterpretation of medication pictograms in low literacy and limited schooling patients is higher. (78) The need of pictograms, especially when dispensing to older patients and foreigners, was supported in the focus group discussion. Participants explained that pictograms symbolizing day and night are really helpful in such cases, making it a lot easier for both the pharmacist and the foreign patient to understand the correct and safe use of medication.

Further analysis of focus group discussion revealed that Lithuanian pharmacists provide written information regularly to their patients, even though it is not mandatory by law. They use this practise to enhance the clarity, adherence and safety of dispensed medications. However, pharmacist revealed that sometimes they are unable to provide information in a written form due to lack of time. Only spoken information is provided in such cases. Study by Hamrosi et al. also highlighted the problem of lack of time. Many pharmacists admitted that they only have sufficient time to provide information orally. (74)

Lithuanian pharmacists expressed support for label standardization in the country, highlighting the Estonian label example as a good practise. Estonian example included information on patient and medication name, strength, quantity dispensed, use information, pharmacy name and contact information, prescribers' name and phone number. All pharmacists agreed that they would exclude the physicians' phone numbers. This preferred information would correspond to Recommendations from the FIP Working Group on Labelling, highlighting that general information should include name of medicine, strength, warnings and directions for use and individualised information should include name of patient, dosage instructions and indication or intended use. (79)

In this study lack of initiative and financial costs were identified as the main obstacles to implementing standardized pharmacy labels in Lithuania. One participant highlighted that someone needs to take the first step and propose this idea to the ministry. Lastly, all participants agreed that, initially, some pharmacists would be hesitant with proposed labelling changes, as not all individuals are willing to change their practise. In summary, standardization would take time and effort, and some resistance is expected; however, if implemented, pharmacy labels would enhance medication safety and medication adherence.

5. STUDY STRENGTHS AND LIMITATIONS

Strengths

The study includes responses from thirty-two different countries, reflecting variation across countries and enabling comparative analysis. In addition, the inclusion of participants with professional experience in pharmacy, hospital and academia ensures a diversity of professional perspectives. The survey and focus group discussion were conducted with specialists with real work experience, so the results are based on practical insights not just theoretical assumptions. Moreover, the results of the study may be useful in developing pilot projects, educational initiatives or proposing legal reforms related to the development of standardized pharmacy labels and written information in Lithuania.

Limitations

The inclusion of more countries would have strengthened the study by offering a broader range of practises and examples. Furthermore, the translation of legal requirements from their original languages to English using translation tools, represents a potential limitation, as inaccuracies might occur. Finally, the findings on perceptions of written information may have differed if a larger number of specialists had participated.

CONCLUSIONS

1. The most common practise is to provide written information by sticking a label, writing directly on the medication package, or using combination of both methods across the countries included in the study.
2. There are legal requirements on written information in minority of the countries included in this study. Most common requirements are to include instructions on how to use medicine, patient name and pharmacy name where the medication was dispensed.
3. Most specialists in this study perceive pharmacy labels and written information both as intervention enhancing medication adherence and safe medicine use.
4. Lithuanian pharmacists expressed the need for standardized written information in the country. They identified that the best practise would be the use of standardized pharmacy labels, like the Estonian example, including instructions for use, medication name, strength, quantity dispensed and remaining on the prescription, as well as the pharmacy name and address and the prescribing physician's name. The patient's name was considered optional due to patient privacy considerations and patient preference.

RECOMMENDATIONS

1. It is recommended to start discussions on pharmacy labels and written information standardization in Lithuania, including format and the specific elements they should contain.
2. It is recommended to initiate a pilot project in several pharmacies in which standardized pharmacy labels would be implemented, to observe how both patients and pharmacists respond to their use and benefits.
3. It is recommended to conduct more research in Lithuania analysing the implementation of standardization of written information, thus contributing to the formation of initiatives. Further research results would enable a more accurate identification of the strengths and weaknesses in standardization implementation.

REFERENCES

1. Young HN, Pathan FS, Hudson S, Mott D, Smith PD, Schellhase KG. Impact of patient-centered prescription medication labels on adherence in community pharmacy. *Journal of the American Pharmacists Association*. 2023 May 1;63(3):785–92. doi:10.1016/j.japh.2023.01.004 PubMed PMID: 36725425.
2. Baker DW. The meaning and the measure of health literacy. *Journal of General Internal Medicine*. 2006. p. 878–83. doi:10.1111/j.1525-1497.2006.00540.x PubMed PMID: 16881951.
3. Hippocrates. Prognostic. Regimen in Acute Diseases. The Sacred Disease. The Art. Breaths. Law. Decorum. Dentition. Edited and translated by Paul Potter. Loeb Classical Library 148. Cambridge, MA: Harvard University Press. 2023.
4. Sabaté Eduardo. Adherence to long-term therapies : evidence for action. World Health Organization; 2003. 194 p.
5. Anghel LA, Farcas AM, Oprean RN. An overview of the common methods used to measure treatment adherence. *Med Pharm Rep*. 2019;92(2):117–22. doi:10.15386/mpr-1201
6. Singh N, Varshney U. Medication adherence: A method for designing context-aware reminders. *Int J Med Inform*. 2019 Dec 1;132. doi:10.1016/J.IJMEDINF.2019.103980 PubMed PMID: 31586826.
7. Vrijens B, De Geest S, Hughes DA, Przemyslaw K, Demonceau J, Ruppar T, et al. A new taxonomy for describing and defining adherence to medications. *Br J Clin Pharmacol*. 2012 May;73(5):691–705. doi:10.1111/j.1365-2125.2012.04167.x PubMed PMID: 22486599.
8. People having a long-standing illness or health problem, by sex, age and income quintile [Internet]. Available from: https://ec.europa.eu/eurostat/databrowser/view/hlth_silc_11/default/table?lang=en
9. Chong B, Jayabaskaran J, Jauhari SM, Chan SP, Goh R, Kueh MTW, et al. Global burden of cardiovascular diseases: projections from 2025 to 2050. *Eur J Prev Cardiol*. 2025 Aug 1;32(11):1001–15. doi:10.1093/eurjpc/zwae281 PubMed PMID: 39270739.
10. Lee EKP, Poon P, Yip BHK, Bo Y, Zhu MT, Yu CP, et al. Global Burden, Regional Differences, Trends, and Health Consequences of Medication Nonadherence for Hypertension During 2010 to 2020: A Meta-Analysis Involving 27 Million Patients. *Journal of the American Heart Association*. American Heart Association Inc.; 2022. doi:10.1161/JAHA.122.026582 PubMed PMID: 36056737.
11. Treciokiene I, Bratcikoviene N, Gulbinovic J, Wettermark B, Taxis K. Non-persistence to antihypertensive drug therapy in Lithuania. *Eur J Clin Pharmacol*. 2022 Oct 1;78(10):1687–96. doi:10.1007/s00228-022-03369-0 PubMed PMID: 35918539.
12. Kirilova K, Trečiokienė I, Bratčikovienė N, Qvarnström M, Wettermark B. Persistence to statin treatment: A cohort study in Lithuania. *Basic Clin Pharmacol Toxicol*. 2024 Jul 1;135(1):43–51. doi:10.1111/bcpt.14015 PubMed PMID: 38682475.

13. Corrao G, Rea F, Monzio Compagnoni M, Merlino L, Mancina G. Protective effects of antihypertensive treatment in patients aged 85 years or older. *J Hypertens*. 2017 Jul 1;35(7):1432–41. doi:10.1097/HJH.0000000000001323 PubMed PMID: 28319595.
14. Kvarnström K, Westerholm A, Airaksinen M, Liira H. Factors contributing to medication adherence in patients with a chronic condition: A scoping review of qualitative research. *Pharmaceutics*. MDPI AG; 2021. doi:10.3390/pharmaceutics13071100 PubMed PMID: 34371791.
15. Scott M, Horvat M, Eržen I, Vrbnjak D. Barriers and Facilitators to Medication Adherence among the Vulnerable Elderly: A Focus Group Study [Internet]. 2024. doi:10.3390/healthcare12171723
16. Gellad WF, Grenard JL, Marcum ZA. A systematic review of barriers to medication adherence in the elderly: Looking beyond cost and regimen complexity. *American Journal Geriatric Pharmacotherapy*. 2011;9(1):11–23. doi:10.1016/J.AMJOPHARM.2011.02.004 PubMed PMID: 21459305.
17. Lafeber M, Grobbee DE, Spiering W, Van Der Graaf Y, Bots ML, Visseren FLJ. The combined use of aspirin, a statin, and blood pressure-lowering agents (polypill components) in clinical practice in patients with vascular diseases or type 2 diabetes mellitus. *Eur J Prev Cardiol*. 2013 Oct;20(5):771–8. doi:10.1177/2047487312449587 PubMed PMID: 22649123.
18. Gow K, Rashidi A, Whithead L. Factors Influencing Medication Adherence Among Adults Living with Diabetes and Comorbidities: a Qualitative Systematic Review. *Current Diabetes Reports*. Springer; 2024. p. 19–25. doi:10.1007/s11892-023-01532-0 PubMed PMID: 38112977.
19. García-Pérez LE, Alvarez MA, Dilla T, Gil-Guillén V, Orozco-Beltrán D, García-Pérez LE, et al. Adherence to Therapies in Patients with Type 2 Diabetes. *Diabetes Ther*. 2013;4:175–94. doi:10.1007/s13300-013-0034-y
20. Pollack MF, Purayidathil FW, Bolge SC, Williams SA. Patient-reported tolerability issues with oral antidiabetic agents: Associations with adherence; treatment satisfaction and health-related quality of life. *Diabetes Res Clin Pract*. 2010 Feb;87(2):204–10. doi:10.1016/j.diabres.2009.11.023 PubMed PMID: 20036433.
21. Gassmann C, Kolbe N, Brenner A. Experiences and coping strategies of oncology patients undergoing oral chemotherapy: First steps of a grounded theory study. *European Journal of Oncology Nursing*. 2016 Aug 1;23:106–14. doi:10.1016/j.ejon.2016.06.001 PubMed PMID: 27456382.
22. Jarab AS, Mukattash TL, Al-Azayzih A, Khmour M. A focus group study of patient's perspective and experiences of type 2 diabetes and its management in Jordan. *Saudi Pharmaceutical Journal*. 2018 Mar 1;26(3):301–5. doi:10.1016/j.jsps.2018.01.013
23. Seng JJB, Tan JY, Yeap CT, Htay H, Foo WYM. Factors affecting medication adherence among pre-dialysis chronic kidney disease patients: a systematic review and meta-analysis of literature. *International Urology and Nephrology*. Springer; 2020. p. 903–16. doi:10.1007/s11255-020-02452-8 PubMed PMID: 32236780.
24. Williams AF, Manias E, Walker R. Adherence to multiple, prescribed medications in diabetic kidney disease: A qualitative study of consumers' and health professionals'

perspectives. *Int J Nurs Stud*. 2008 Dec;45(12):1742–56. doi:10.1016/j.ijnurstu.2008.07.002 PubMed PMID: 18701103.

25. Van Geffen ECG, Hermesen JHCM, Heerdink ER, Egberts ACG, Verbeek-Heida PM, Van Hulten R. The decision to continue or discontinue treatment: Experiences and beliefs of users of selective serotonin-reuptake inhibitors in the initial months-A qualitative study. *Research in Social and Administrative Pharmacy*. 2011 Jun;7(2):134–50. doi:10.1016/j.sapharm.2010.04.001 PubMed PMID: 21272543.

26. Turner BJ, Hollenbeak C, Weiner MG, Ten Have T, Roberts C. Barriers to adherence and hypertension control in a racially diverse representative sample of elderly primary care patients. *Pharmacoepidemiol Drug Saf*. 2009;18(8):672–81. doi:10.1002/pds.1766 PubMed PMID: 19479901.

27. Kassahun T, Gesesew H, Mwanri L, Eshetie T. Diabetes related knowledge, self-care behaviours and adherence to medications among diabetic patients in Southwest Ethiopia: A cross-sectional survey. *BMC Endocr Disord*. 2016 May 31;16(1). doi:10.1186/s12902-016-0114-x PubMed PMID: 27381349.

28. Gazmararian JA, Kripalani S, Miller MJ, Echt K V, Ren J, Rask K. ORIGINAL ARTICLES Factors Associated with Medication Refill Adherence in Cardiovascular-related Diseases A Focus on Health Literacy. doi:10.1111/j

29. Liu C, Wang D, Liu C, Jiang J, Wang X, Chen H, et al. What is the meaning of health literacy? A systematic review and qualitative synthesis. *Fam Med Com Health*. 2020;8:351. doi:10.1136/fmch-2020-000351

30. Miller TA. Health literacy and adherence to medical treatment in chronic and acute illness: A meta-analysis. *Patient Education and Counseling*. Elsevier Ireland Ltd; 2016. p. 1079–86. doi:10.1016/j.pec.2016.01.020 PubMed PMID: 26899632.

31. Wali H, Hudani Z, Wali S, Mercer K, Grindrod K. A systematic review of interventions to improve medication information for low health literate populations. *Research in Social and Administrative Pharmacy*. Elsevier Inc.; 2016. p. 830–64. doi:10.1016/j.sapharm.2015.12.001 PubMed PMID: 26926671.

32. Achterbosch M, Aksoy N, Obeng GD, Ameyaw D, Ágh T, M van Boven JF, et al. Clinical and economic consequences of medication nonadherence: a review of systematic reviews. 2025. doi:10.3389/fphar.2025.1570359

33. van Boven JFM, Lavorini F, Agh T, Sadatsafavi M, Patino O, Muresan B. Cost-Effectiveness and Impact on Health Care Utilization of Interventions to Improve Medication Adherence and Outcomes in Asthma and Chronic Obstructive Pulmonary Disease: A Systematic Literature Review. *Journal of Allergy and Clinical Immunology: In Practice*. 2024 May 1;12(5):1228–43. doi:10.1016/j.jaip.2023.12.049 PubMed PMID: 38182099.

34. Ho SC, Chong HY, Chaiyakunapruk N, Tangiisuran B, Jacob SA. Clinical and economic impact of non-adherence to antidepressants in major depressive disorder: A systematic review. *J Affect Disord*. 2016 Mar 15;193:1–10. doi:10.1016/j.jad.2015.12.029 PubMed PMID: 26748881.

35. Birnbaum HG, Ben-Hamadi R, Kelley D, Hsieh M, Seal B, Kantor E, et al. Assessing the relationship between compliance with antidepressant therapy and employer costs among

- employees in the united states. *J Occup Environ Med.* 2010;52(2):115–24. doi:10.1097/JOM.0b013e3181cb5b10
36. Frieden P, Gagnon R, B  nard   , Cossette B, Bergeron F, Talbot D, et al. Strategies aiming to improve statin therapy adherence in older adults: a systematic review. *BMC Geriatr.* 2024 Dec 1;24(1). doi:10.1186/s12877-024-05031-z PubMed PMID: 38773394.
 37. Paoli C, Linder J, Gurjar K, Thakur D, Wyckmans J, Grieve S. Effectiveness of Single-Tablet Combination Therapy in Improving Adherence and Persistence and the Relation to Clinical and Economic Outcomes. *J Health Econ Outcomes Res.* 2024;8–22. doi:10.36469/jheor.2024.91396
 38. Parati G, Kjeldsen S, Coca A, Cushman WC, Wang J. Adherence to Single-Pill Versus Free-Equivalent Combination Therapy in Hypertension: A Systematic Review and Meta-Analysis. *Hypertension.* 2021 Feb 1;77(2):692–705. doi:10.1161/HYPERTENSIONAHA.120.15781 PubMed PMID: 33390044.
 39. Parwati NM, Bakta IM, Januraga PP, Wirawan IMA. A health belief model-based motivational interviewing for medication adherence and treatment success in pulmonary tuberculosis patients. *Int J Environ Res Public Health.* 2021 Dec 1;18(24). doi:10.3390/ijerph182413238 PubMed PMID: 34948846.
 40. Mackridge AJ, Wood EM, Hughes DA. Improving medication adherence in the community: a purposive umbrella review of effective patient-directed interventions that are readily implementable in the United Kingdom National Health Service. *International Journal of Clinical Pharmacy.* Springer Science and Business Media Deutschland GmbH; 2025. p. 640–53. doi:10.1007/s11096-025-01885-4 PubMed PMID: 40085413.
 41. Mayberry LS, Osborn CY. Family support, medication adherence, and glycemic control among adults with type 2 diabetes. *Diabetes Care.* 2012 Jun;35(6):1239–45. doi:10.2337/dc11-2103 PubMed PMID: 22538012.
 42. Dayer L, Heldenbrand S, Anderson P, Gubbins PO, Martin BC. Smartphone medication adherence apps: Potential benefits to patients and providers. *Journal of the American Pharmacists Association.* 2013;53(2):172–81. doi:10.1331/JAPhA.2013.12202 PubMed PMID: 23571625.
 43. Burgos-Alonso N, Torrecilla M, Mendiguren A, P  rez-G  mez Moreta M, Bruzos-Cid  n C. Strategies to Improve Therapeutic Adherence in Polymedicated Patients over 65 Years: A Systematic Review and Meta-Analysis. *Pharmacy.* 2024 Feb 17;12(1):35. doi:10.3390/pharmacy12010035
 44. Capoccia K, Odegard PS, Letassy N. Medication Adherence With Diabetes Medication: A Systematic Review of the Literature. *Diabetes Educ.* 2016;42(1):34–71. doi:10.1177/0145721715619038 PubMed PMID: 26637240.
 45. Awan NR, Jehangir SF, Irfan M, Naeem F, Farooq S. Explanatory model of illness of the patients with schizophrenia and the role of educational intervention. *Schizophr Res.* 2017 Dec 1;190:68–73. doi:10.1016/j.schres.2017.03.006 PubMed PMID: 28291691.
 46. Bosworth HB, DuBard CA, Ruppenkamp J, Trygstad T, Hewson DL, Jackson GL. Evaluation of a self-management implementation intervention to improve hypertension control

- among patients in Medicaid. *Transl Behav Med.* 2011 Mar;1(1):191–9. doi:10.1007/s13142-010-0007-x
47. Janssen WF, Historian F. The Story of the Laws Behind the Labels [Internet]. Available from: www.fda.gov
 48. Marks HM. Public Health Then and Now Revisiting “The Origins of Compulsory Drug Prescriptions.”
 49. Wall EC. A Comprehensive Look at the Fair Packaging and Labeling Act of 1966 and the FDA Regulation of Deceptive Labeling and Packaging Practices: 1906 to Today Citation A Comprehensive Look at the Fair Packaging and Labeling Act of 1966 and the FDA Regulation of Deceptive Labeling and Packaging Practices Terms of use Share Your Story A Comprehensive Look at the Fair Packaging and Labeling Act of 1966 and the FDA Regulation of Deceptive Labeling and Packaging Practices: 1906 to Today [Internet]. 2002. Available from: <https://harvardwiki.atlassian.net/wiki/external/NGY5NDE4ZjgzNTc5NDQzMGIzZWZhMGFLOWI2M2EwYTgAccessibilityhttps://accessibility.huit.harvard.edu/digital-accessibility-policy>
 50. Smithsonian Institution. Prescription labels [Internet]. Washington (DC): Smithsonian National Museum of American History. Available from: <https://americanhistory.si.edu/fr/collections/object-groups/bristol-myers-squibb-european-apothecary/prescription-labels>.
 51. Lietuvos muziejų asociacija. Bagdonienė. Vilnius: Lietuvos muziejų asociacija [Internet]. Available from: <https://www.museums.lt/Biblioteka/Bagdoniene.htm>.
 52. Manchanayake MGCA, Bandara GRWSK, Samaranayake NR. Patients’ ability to read and understand dosing instructions of their own medicines - A cross sectional study in a hospital and community pharmacy setting. *BMC Health Serv Res.* 2018 Jun 7;18(1). doi:10.1186/s12913-018-3252-1 PubMed PMID: 29879961.
 53. Maghroudi E, Van Hooijdonk CMJ, Van de Bruinhorst H, Van Dijk L, Rademakers J, Borgsteede SD. The impact of textual elements on the comprehensibility of drug label instructions (DLIs): A systematic review. *PLoS ONE. Public Library of Science;* 2021. doi:10.1371/journal.pone.0250238 PubMed PMID: 34010291.
 54. Mullen RJ, Duhig J, Russell A, Scarazzini L, Lievano F, Wolf MS. Best-practices for the design and development of prescription medication information: A systematic review. *Patient Educ Couns.* 2018 Aug 1;101(8):1351–67. doi:10.1016/J.PEC.2018.03.012 PubMed PMID: 29548600.
 55. European Commission. Guideline on the readability of the labelling and package leaflet of medicinal products for human use. Brussels: European Commission; 2009. Available from: https://health.ec.europa.eu/system/files/2016-11/2009_01_12_readability_guideline_final_en_0.pdf.
 56. Creswell, J. W. (2009). *Research design Qualitative, quantitative, and mixed methods approaches* (3rd ed.). SAGE Publications.

57. Sardana N, Shekoochi S, Cornett EM, Kaye AD. Qualitative and quantitative research methods. In: Substance Use and Addiction Research: Methodology, Mechanisms, and Therapeutics. Elsevier; 2023. p. 65–9. doi:10.1016/B978-0-323-98814-8.00008-1
58. Žakarytė U. 77th Student Research Network Conference at the Faculty of Medicine of Vilnius University. Vilnius University Proceedings. 2025 May 6;1–529. doi:10.15388/smvk.2025
59. Rupšienė, L. Bitinas, B., Žydzūnaitė, V. Kokybių tyrimų metodologija vadovėlis vadybos ir administravimo studentams. Klaipėda S.Jokužio leidykla-spaustuvė; 2008.
60. Bekendtgørelse nr. 827 af 2024. København: Retsinformation; 2024 [Internet]. Available from: <https://www.retsinformation.dk/eli/lta/2024/827>.
61. Finnish Medicines Agency (Fimea). Lääkevalmisteiden myyntipäällyksmerkinnät ja pakkausseloste. Ohje 1/2019 [Internet]. Helsinki: Fimea; 2019.
62. Bundesministerium der Justiz. Verordnung über den Betrieb von Apotheken (Apothekenbetriebsordnung – ApBetrO), § 14 Kennzeichnung [Internet]. Berlin: Gesetze im Internet; 1987. Available from: https://www.gesetze-im-internet.de/apobetro_1987/__14.html.
63. Icelandic Medicines Agency (IMA). Dossier 004: Standards for Quality of Pharmacy Services. Reykjavík: IMA; 2021.
64. Ireland. Medicinal Products (Prescription and Control of Supply) Regulations 2003 (S.I. No. 540/2003) [Internet]. Dublin: Irish Statute Book; 2003. Available from: <https://www.irishstatutebook.ie/eli/2003/si/540>.
65. Directive 2001/83/EC of the European Parliament and of the Council of 6 November 2001 on the Community code relating to medicinal products for human use (OJ L 311, 28.11.2001, p. 67) [Internet]. Brussels: European Union; 2001. Available from: <https://www.wipo.int/wipolex/en/legislation/details/13061>.
66. Medicines Evaluation Board (MEB). Policy document MEB-6: Labelling of pharmaceutical products. Utrecht: MEB; 2025 May.
67. Apotekforeningen. Signering i resepturen [Internet]. Oslo: Apotekforeningen; 2018. Available from: https://www.apotek.no/Files/Filer_2013/Lukkede%20sider/Signering%20i%20resepturen_15okt2018.pdf.
68. Läkemedelsverket. Läkemedelsverkets föreskrifter om förordnande och utlämnande av läkemedel och teknisk sprit (HSLF-FS 2021:75). Stockholm: Socialstyrelsen; 2021.
69. Human Medicines Regulations 2012, SI 2012/1916, Sch 25 (UK). London: The Stationery Office; 2012.
70. International Medication Safety Network. IMSN position paper on making medicines naming, labelling and packaging safer [Internet]. 2013 Oct. Available from: <https://www.intmedsafe.net/wp-content/uploads/2014/07/Making-Medicines-Naming-Labeling-and-Packaging-Safer-Final-A4-2013.pdf>.
71. Australian Commission on Safety Quality in Health Care, NSW Clinical Excellence Commission. Improving the safety and quality of pharmacy dispensing labels. National round table report 25 November 2013. Sydney: ACSQHC; 2014.

72. Vitor C, Cavaco A. Community pharmacists' attitudes towards patient leaflets: Exploring perceptions underlying an electronic local production of tailored written information. *AIMS Public Health*. 2018;5(2):189–202. doi:10.3934/publichealth.2018.2.189
73. Wolf MS, Davis TC, Curtis LM, Bailey SC, Knox JAP, Bergeron A, et al. A Patient-Centered Prescription Drug Label to Promote Appropriate Medication Use and Adherence. *J Gen Intern Med*. 2016 Dec 1;31(12):1482–9. doi:10.1007/s11606-016-3816-x PubMed PMID: 27542666.
74. Hamrosi KK, Raynor DK, Aslani P. Pharmacist and general practitioner ambivalence about providing written medicine information to patients-A qualitative study. *Research in Social and Administrative Pharmacy*. 2013 Sep;9(5):517–30. doi:10.1016/j.sapharm.2013.02.006 PubMed PMID: 23567071.
75. Yuan HCT, Raynor DK, Aslani P. Comparison of International Regulations for Written Medicine Information (WMI) on Prescription Medicines. *Therapeutic Innovation and Regulatory Science*. SAGE Publications Inc.; 2019. p. 215–26. doi:10.1177/2168479018776949 PubMed PMID: 29807471.
76. Samaranayake NR, Bandara WG, Manchanayake CM. A narrative review on do's and don'ts in prescription label writing - lessons for pharmacists. *Integr Pharm Res Pract*. 2018 Jun 13;7:53-66. doi: 10.2147/IPRP.S163968. PMID: 29942789; PMCID: PMC6005331.
77. Yin HS, Dreyer BP, Linda Van Schaick ;, George E;, Foltin L, Dinglas C, et al. Randomized Controlled Trial of a Pictogram-Based Intervention to Reduce Liquid Medication Dosing Errors and Improve Adherence Among Caregivers of Young Children [Internet]. Vol. 162. 2015. Available from: <http://archpedi.jamanetwork.com/>
78. Dowse R, Okeyo S, Sikhondze S, Khumalo N. Pharmaceutical indication pictograms for low literacy viewers: Health literacy and comprehension. *Health SA Gesondheid*. 2023;28. doi:10.4102/hsag.v28i0.2192
79. International Pharmaceutical Federation. FIP guidelines for the labels of prescribed medicines. The Hague: International Pharmaceutical Federation; 2001.

Appendix 1. Abstract of the PLIMA pilot study submitted to the 77th Conference of the Student Scientific Activity Network (SMVT) conference.

VAISTININKŲ NUOMONĖ APIE RAŠYTINĖS INFORMACIJOS REIKŠMĘ VAISTŲ VARTOJIMO REŽIMO LAIKYMUISI. PILOTINIS TYRIMAS

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Tikslas. Įvertinti vaistininkų nuomonę apie rašytinės vaistų informacijos reikšmę vaistų vartojimo režimo laikymuisi.

Metodai. Šio kokybinio tyrimo instrumentas – individualus interviu su pusiau struktūrizuotais klausimais. Šiame tyrime buvo apklausiami vaistininkai. Pirmoji interviu dalis buvo skirta išsiaiškinti, kokiomis priemonėmis receptinių vaistų išdavimo metu pacientams suteikiama informacija apie vaistų vartojimą. Antroji dalis – įvertinti specialistų nuomonę apie rašytinės informacijos reikšmę vaistų vartojimo režimo laikymuisi. Interviu metu taip pat buvo fotografuojamos priemonės naudojamos informacijai teikti, o gautos nuotraukos analizuojamos identifikuojant svarbiausius elementus. Šis tyrimas yra *Pharmacy Labels And Written Information on Medication Adherence* (PLIMA) tyrimo dalis.

Rezultatai. 2025 m. kovo mėn. atliktame interviu dalyvavo 12 vaistininkų, dirbančių septyniuose skirtinguose Vilniaus vaistinėse. Nustatyta, kad visi apklausti vaistininkai informaciją apie vaistų vartojimą dažniausiai teikia tiek žodžiu, tiek raštu, kitų priemonių nenurodė. Beveik visi vaistininkai naudojo specialias etiketes – lipdukus, kuriose nurodoma kaip dažnai, koku paros metu, prieš, su ar po valgio vartoti vaistą. Dažniausiai etiketes specialistai priklijuoja ant vaisto pakuotės ir žodžiu paaiškina jose pateiktą informaciją. Daugiau nei pusė vaistininkų nurodė, kad, esant dideliame vaistinės užimtumui, rašytinė informacija etiketėse neteikiama, informacija pateikiama tik žodžiu. Visi tyrime dalyvavę vaistininkai pritarė, kad rašytinė informacija apie vaistų vartojimą prisideda prie geresnio vaistų vartojimo režimo laikymosi. Vaistininkų nuomone, tai aktualiausia pacientams, kurie vartoja daugiau nei vieną vaistą arba yra vyresnio amžiaus.

Tyrimo metu analizuotos 6-ios vaistinių lipinamos etiketės. Dviejose iš jų buvo pateiktas laukelis apie vaisto vartojimą maisto atžvilgiu, dar dviejose – laukelis paciento vardui pavardei. Trijose etiketėse buvo naudojami paros laiką nurodantys vizualai.

Išvados. Vaistų išdavimo metu vaistininkai teikia informaciją apie vaistų vartojimą žodžiu ir raštu. Teikiant rašytinę informaciją, pasitelkiamos specialios etiketės, kuriose nurodyta pacientams svarbi informacija. Nors rašytinė vaistų informacija daugiausiai suprantama, kaip vaistų vartojimo saugumo priemonė, vaistininkų nuomone, rašytinė informacija taip pat gali būti siejama su geresniu vaistų vartojimo režimo laikymusi.

Raktažodžiai. Vaistų vartojimas; rašytinė informacija; vaistų vartojimo režimo laikymasis.

Appendix 2. Certificate of participation in the EuroDURG 2025 conference.



Certificate of attendance

Kornelija Klinkaitė
Vilnius University

Has attended the

European Drug Utilization Conference - EuroDURG 2025

July 1-4, 2025 in Uppsala, Sweden

On behalf of the scientific and organizing committees

Björn Wettermark
Chair
Local Organising Committee

Sabine Vogler
Chair
Scientific Committee

Indrė Trečiokienė
Co-Chair
Scientific Committee

Appendix 3. Abstract and oral presentation slides submitted and presented at the EuroDURG 2025 conference.

European Drug Utilization Conference 2025
Bridging data, policy and patients in drug utilization research

ispe
EuroDURG

*Kornelija Klinkaitė*¹, *Rūta Matulaitienė*², *Nomeda Bratčikovienė*², *Anne Gerd Granås*²,
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**Kornelija
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Pharmacy Labels and Written Information on Medication Adherence: PLIMA study protocol

**Kornelija Klinkaitė, Rūta
Matulaitienė, Nomeda
Bratčikovienė, Anne Gerd
Granås, Indrė Trečiokienė**

Vilnius University, Lithuania
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- To compare pharmacy label use in practise and legal requirements across European countries.
- Study participants upload pharmacy labelling information, including image examples and national legal requirements.

- Results could provide valuable insights into cross – national variations in pharmacy labelling and written information.

Background

It is the key responsibility of health care specialists to provide patients with readable and understandable information about their medication. Pharmacy labels are first seen as a safety measure that supports the safe and appropriate use of medicines. Yet some studies show that pharmacy labels could also be associated with improved medication adherence. Guidelines on pharmacy labels and written information vary across European countries. The aim of this study is to compare pharmacy label requirements and use in practice across European countries.

Methods

In this cross-sectional descriptive study, data from all European countries will be collected. Identified key opinion leaders will be contacted to collect pharmacy labelling information, including image examples, national legal requirements and perception on pharmacy label as medication adherence measures alongside responders' information. The study aims at 3 to 4 key opinion leaders or health care professionals per country. Respondents will be recruited through the COST Enable network by e-mail, and responses will be collected through the Qualtrics survey platform. Descriptive statistics will be used to analyse responses. Content, visual, and contextual analyses will be used on the images provided.

Results

This far, the recruitment process has started. The questionnaire has been created and is undergoing piloting. Primary results are planned in May 2025.

Conclusions

The findings of the PLIMA study have the potential to offer valuable insights into differences of pharmacy labelling and written information across countries. The results may inform decisions for better patient care and improved medication adherence.

Appendix 4. Certificate of participation in the ESPACOMP 2025 conference.

CERTIFICATE OF ATTENDANCE

Kornelija Klinkaitė

attended the event



Pharmacy labels and written information on medication adherence: PLIMA study

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Abstract

Aim: Pharmacy labels are a safety measure that supports safe use of medication. It can also be associated with medication adherence. The PLIMA study aims to compare pharmacy label legal requirements, use in practice across European countries and healthcare professionals' perception on pharmacy labels' association with medication adherence.

Methods: In this cross-sectional descriptive study data is collected from all European countries. Experts are recruited through the COST Enable network by e-mail, invitations to participate are distributed at conferences and relevant specialist platforms. Through the Qualtrics survey platform, respondents are asked to collect pharmacy labelling information, including image examples, national legal requirements and perception on pharmacy labels as medication adherence, alongside responders' information. Responses will be analysed using descriptive statistics. Visual, content, and contextual analysis will be used on the images and documents provided.

Results: The questionnaire has been pre-tested in a pilot study to identify and correct potential issues. Invitations have been distributed at the EAFP annual conference 2025 in May 2025, e-mail invitations have been sent in July 2025. So far, responses have been received from 8 countries. Primary results show that legal requirements for pharmacy labels vary, yet the majority of respondents agree that pharmacy labels could be linked to medication adherence.

Discussion and Conclusion: Findings of the PLIMA study could provide valuable insights into cross-national differences in pharmacy labelling and written information. Results obtained from this research may encourage better decisions, potentially leading to more efficient and adherent medication usage.

Pharmacy Labels and Written Information on Medication Adherence: PLIMA study

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Introduction

Written information is often considered as a safety measure, but it can also be connected to a better adherence. Written information and pharmacy labels contain crucial information for patients about their treatment, like directions on how to use the drug, when to use it, what to avoid while taking drug and etc. It can also contain visuals that help the patient to understand instructions better. Different pharmacy labelling practices and legal requirements exist across the Europe. Understanding these differences and assessing specialist's perception, can provide valuable lessons for healthcare systems.

Aim

The aim of this study is to compare pharmacy label requirements and use in practice across European countries.

Methodology

- In this study Pharmacy Labels and Written Information is considered as pharmacy dispensing labels or other similar way to provide written information for patients when dispensing medication.
- 1 - 4 key opinion leaders were recruited from 24 countries through the COST Enable network by e-mail, as well as through invitations distributed at conferences and relevant specialist platforms.
- Responses were collected through the Qualtrics survey platform and analyzed using descriptive statistics.
- Respondents were asked to collect pharmacy labelling information, including image examples, national legal requirements and perception on pharmacy labels as medication adherence alongside responders' information.

Results



Results were gathered from 24 countries



Examples of pharmacy labels and written information from Finland and Bulgaria

		n	%
How the written information on dispensed Rx (prescribed medicines) is provided for patients	Pharmacist sticks label with information on the package	18	75.00
	Pharmacist writes information on the package by hand	14	58.33
	A medicine use list is provided to the patient	8	33.33
	Medicine use information is provided digitally	6	25.00
	Other	4	16.67
	No written information is provided	5	20.83

n – number of countries

		n	%
Information legally required to be provided to the patient in the written form (10 countries)	Patient name and (or) surname	6	60.00
	Indication	4	40.00
	Instruction on how to use medicine	8	80.00
	Cautions and restrictions	3	30.00
	Prescribing doctor's name and surname	3	30.00
	Practise name where the medicine was prescribed	1	10.00
	Pharmacy name where the medicine was dispensed	6	60.00
	Pharmacy contact information	3	30.00
	Other	5	50.00

Conclusions

- The findings of the PLIMA study show valuable insights into differences of pharmacy labelling and written information across countries.
- There are legal requirements for providing written information and pharmacy labels in pharmacies in the 10 countries included in this study. Most common requirements on labels are to include:
 - instruction on how to use medicine
 - patient name and (or) surname
 - pharmacy name where the medicine was dispensed.
- 89% of responders perceive written pharmacy information both as intervention enhancing medication adherence and as safe medicine use.

VAISTINIŲ ETIKEČIŲ IR RAŠYTINĖS INFORMACIJOS REIKŠMĖ VAISTŲ VARTOJIMO REŽIMO LAIKYMUISI

Autorė. Kornelija KLINKAITĖ, V kursas.

Vadovė. Doc. Dr. Indrė TREČIOKIENĖ, VU MF Biomedicinos mokslų institutas, Farmacijos ir farmakologijos centras.

Tikslas. Palyginti vaistinių etikečių ir rašytinės informacijos reikalavimus, jų praktinį pritaikymą ir specialistų požiūrį Europos šalyse.

Metodai. Šiame tyrime vaistinių etiketės ir rašytinė informacija laikomos vaistų išdavimo metu pacientams pateikiamos etiketės ar kita rašytinė informacija, susijusi su vaistų vartojimo instrukcijomis. Tyrimo duomenys surinkti Qualtrics apklausų platformoje, naudojant struktūrizuotą klausimyną su atvirojo ir uždarojo tipo klausimais. Duomenų analizei pasirinktas mišrus analizės metodas. Duomenų analizė atlikta trimis žingsniais: pirma, išanalizuoti klausimai, susiję su priemonėmis, naudojamomis vaistų išdavimo metu teikiant informaciją apie jų vartojimą; antra, įvertinta specialistų nuomonė apie rašytinės informacijos reikšmę vaistų vartojimo režimo laikymuisi; trečia, analizuotos vaistinių etikečių ir rašytinės informacijos nuotraukos.

Rezultatai. Tyrime apklausti specialistai iš 32 šalių. Nustatyta, kad 63% tyrime dalyvavusių šalių informacija apie vaistų vartojimą pateikiama naudojant specialias etiketes. Šiose etiketėse dažniausiai nurodomas vaisto pavadinimas, stiprumas, vartojimo instrukcijos (pvz., paros laikas, vartojimas prieš, su ar po valgio), išdavimo data, indikacija ir specialūs įspėjimai. Kai kuriose šalyse papildomai pateikiama vaistininko ir gydytojo vardas pavardė, taip pat vaistinės kontaktai. 59% tyrime dalyvavusių šalių informacija pateikiama rašant tiesiogiai ant išduodamų vaistų pakuočių. Tokiu būdu pateikiama informacija paprastai yra trumpesnė ir dažniausiai apsiriboja vartojimo instrukcijomis. Nors rašytinė vaistų informacija dažniausiai suvokiama kaip vaistų vartojimo saugumo užtikrinimo priemonė, 81% specialistų ją vertino ne tik kaip saugumo užtikrinimo priemonę, bet ir kaip svarbų veiksnį prisidedantį prie geresnio vaistų vartojimo režimo laikymosi. Nuotraukų analizės metu identifikuoti skirtumai tarp pateikiamos informacijos turinio, išdėstymo, spalvų ir naudojamų simbolių.

Išvados. Vaistų išdavimo metu farmacijos specialistai dažniausiai naudojami specialiomis etiketėmis arba nurodo informaciją raštu tiesiogiai ant dėžutės. Rašytinės informacijos teikimo būdas gali turėti įtakos vaistų vartojimo saugumui ir vaistų vartojimo režimo laikymuisi.

Raktažodžiai. Vaistų vartojimas; rašytinė informacija; vaistų vartojimo režimo laikymasis.