Evaluating Medication Adherence and the Potential Role of Pharmacists in Medicines Use Review Services: A cross-sectional study

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ΠΕΡΙΛΗΨΗ

Objectives: Effective management of chronic diseases requires personalized guidance from healthcare professionals to optimize treatment outcomes. Inadequate medication adherence can exacerbate disease progression and impose additional burdens on healthcare systems. The Medicines Use Review (MUR) service, implemented in some countries, offers structured, face-to-face consultations between pharmacists and patients to improve medication use and address concerns. This study aimed to assess medication adherence among chronic-disease patients in Cyprus, focusing on factors influencing adherence, such as side effects, lack of symptoms, and travel. Additionally, it explored patients' attitudes toward engaging in MUR services.

Methods: A cross-sectional design was employed, recruiting chronic-disease patients across Cyprus. Data were collected via a questionnaire comprising 17 questions and demographic information, and responses were analyzed using SPSS 29.0®, calculating frequencies, means, and standard deviations.

Key Findings: Results indicated that while overall adherence was satisfactory, factors such as adverse effects, symptom absence, and travel often led patients to modify or discontinue medications without consulting a healthcare provider. Notably, most participants expressed willingness to participate in MUR services, highlighting their potential to enhance medication adherence and improve patient outcomes.

Conclusion: although chronic patients in Cyprus demonstrate generally satisfactory adherence, there is a clear need for improved educational and support services to address gaps in understanding and consistency. The expressed willingness to engage in MUR services, irrespective of adherence levels, underscores their potential to promote better health outcomes.

1.   Introduction:

Medication adherence refers to the extent to which patients take their medications as prescribed by their healthcare providers. It involves adhering to the dosage, timing, and frequency recommended in the prescription[1]. Proper medication use is essential for effective treatment, as it allows the medication to work as intended. Numerous studies across various health conditions have shown that non-adherence to medication has attained a significant position in combating morbidity and mortality[2,3,4]. Suboptimal adherence can bring about serious consequences for public health. Indicatively, every year in Europe, approximately 200,000 deaths are attributed to suboptimal medication adherence. Apart from the impact on patients' health, non-adherence also demonstrates economic consequences. It's estimated that the €80–125 billion annually, in EU alone, are needed to fund both the hospitalizations of non-adherent and the wastage of medications[5].

Adherence to medication is essential for managing chronic conditions such as diabetes, hypertension, and other chronic diseases. Appropriate adherence not only ensures effective symptom control but also helps prevent serious complications. Several authors demonstrated a significant association between poor adherence and the development of complications in diabetic patients. Specifically, non-adherent participants were twice as likely to report complications compared to those who adhered to their treatment plans[6]. Poor adherence to antidiabetic medication often results in poorly controlled blood sugar levels, whose causality to severe health issues is well-established. Cardiovascular disease is a major concern, as uncontrolled diabetes can cause high blood pressure and cholesterol problems, thus further increasing the risk of heart disease and stroke[7].

Many healthcare professionals are involved in supporting medication adherence for patients, but pharmacists play a crucial role by providing essential guidance and services to enhance adherence[8, 9, 10]. An effective strategy implies involvement of patients in the decision-making process, which allows them to express concerns and preferences regarding their treatment[11]. Providing comprehensive information about the treatment regimen is essential, as misinformation is a primary cause of non-adherence. Patients should be informed not only about how to take their medication but also about its benefits, risks, alternative treatments, and potential side effects. Since side effects constitute a common reason for discontinuing medication, pharmacists can offer solutions, such as dose adjustments, switching medications, or recommending supportive treatments, and refer patients to appropriate healthcare providers when necessary.

In some countries, these roles have been clearly defined and assigned to pharmacists through well-established services. For instance, pharmacists can improve adherence in cases of chronic illness and polypharmacy by offering services such as the Medicines Use Review (MUR)[12]. Countries, such as the United Kingdom, Spain, Slovenia, the USA, and Australia offer the MUR service through their healthcare systems requiring community pharmacists who opt to provide these services to undergo appropriate training and meet specific service criteria. The Medicines Use Review (MUR) is a scheduled, one-on-one consultation between a pharmacist and a patient,

Table 1 Demographics and Clinical Characteristics

Gender					
		N	Percent	Valid Percent	Cumulative Percent
Valid	Male	54	33.8	33.8	33.8
	Female	106	66.3	66.3	100.0
	Total	160	100.0	100.0	
Age					
		N	Percent	Valid Percent	Cumulative Percent
Valid	18 - 24	18	11.3	11.3	11.3
	25 - 34	23	14.4	14.4	25.6
	35 - 44	14	8.8	8.8	34.4
	45 - 54	33	20.6	20.6	55.0
	55 - 64	32	20.0	20.0	75.0
	65+	40	25.0	25.0	100.0
	Total	160	100.0	100.0	
Disease Category					
		N	Percent	Valid Percent	Cumulative Percent
Valid	Hemoglobinopathies	6	3.8	3.8	3.8
	Others	25	15.6	15.6	19.4
	Respiratory Conditions	15	9.4	9.4	28.7
	Endocrine Disorders	39	24.4	24.4	53.1
	Cardiovascular diseases	44	27.5	27.5	80.6
	Neurological Conditions	13	8.1	8.1	88.8
	Rheumatoid conditions	18	11.3	11.3	100.0
	Total	160	100.0	100.0	

designed to address issues related to medication use. One of the primary goal of this service is to enhance the patient's adherence to their treatment regimen. The review seeks to increase patients' knowledge and understanding of their medications, including the purpose of each medication, correct usage, and the importance of adherence. It also provides an opportunity to identify and address important issues such as medication adherence, side effects, interactions, or other medication-related problems from

Table 2. Descriptive Statistics

1= Strongly Disagree, 2= Disagree, 3= Neutral, 4=Agree, 5= Strongly Agree					
* 1= Always, 2= Usually, 3= Sometimes, 4= Occasionally , 5= Never/ Rarely					
** 1= No, 2= Yes					
	N	Minimum	Maximum	Mean	Std. Deviation
Medication Adherence					
Do you consider taking your medication to be a part of your daily life, like eating or brushing your teeth?	160	2	5	4.56	.689
In the past three weeks, did you take your medication at the prescribed daily dose?	160	1	5	4.53	.793
In the past three weeks, have you taken your medication on time?	160	2	5	4.18	.865
How often do you find it difficult to remember to take all your medications?	160	1	5	4.06	1.065
Have you ever reduced or stopped taking your medication due to side effects without informing your doctor? *	160	1	5	4.52	.868
When your symptoms are under control, do you discontinue your medications? *	160	1	5	4.52	.964
Do you tend to forget your medication when you are traveling or away from home? *	160	1	5	4.40	.919
Daily medication can be challenging for some patients. Do you ever struggle to adhere to your medication regimen? *	160	1	5	3.97	1.141
Attitudes towards MUR					
Are you comfortable discussing your medication with the pharmacist?	160	1	5	4.29	.796
The pharmacist can provide information about your condition and medications. Do you think this service would help you understand the importance of medication adherence?	160	1	5	4.06	.966
Would you be open to having a 15-minute discussion with the pharmacist about your medication once or twice a year?	160	1	5	3.88	1.030
Do you think this discussion with the pharmacist would improve your attitude toward medication?	160	1	5	3.72	1.047
Do you think receiving reminder messages from the pharmacy for medication supply would improve your medication adherence?	160	1	5	4.19	.928
Would you be willing to use an app that sends medication reminders and tracks medication usage?	160	1	5	4.23	.833
Do you think using this app would make it easier for you to remember to take your medications?	160	1	5	4.14	.910
Do you find this service useful? If so, please proceed with the next question. **	160	1	2	1.92	.274
Would you be willing to share your medication use data with the pharmacist during your 15-minute discussion?	148	1	5	3.99	.857

Table 3. Willingness to Discuss Medication with the Pharmacist

		N	Percent	Valid N	Valid Percent	Cumulative N	Cumulative Percent
Valid	Strongly Disagree	1	.6	1	.6	1	.6
	Disagree	4	2.5	4	2.5	5	3.1
	Neutral	16	10.0	16	10.0	21	13.1
	Agree	66	41.3	66	41.3	87	54.4
	Strongly Agree	73	45.6	73	45.6	160	100.0
	Total	160	100.0	160	100.0		

Table 4. Perceived Value of Pharmacist-Provided Information on Medication Adherence

		N	Percent	Valid N	Valid Percent	Cumulative N	Cumulative Percent
Valid	Strongly Disagree	3	1.9	3	1.9	3	1.9
	Disagree	9	5.6	9	5.6	12	7.5
	Neutral	25	15.6	25	15.6	37	23.1
	Agree	62	38.8	62	38.8	99	61.9
	Strongly Agree	61	38.1	61	38.1	160	100.0
	Total	160	100.0	160	100.0		

Table 5. Willingness to Participate in a Medicines Use Review

		N	Percent	Valid N	Valid Percent	Cumulative N	Cumulative Percent
Valid	Strongly Disagree	7	4.4	7	4.4	7	4.4
	Disagree	10	6.3	10	6.3	17	10.6
	Neutral	23	14.4	23	14.4	40	25.0
	Agree	75	46.9	75	46.9	115	71.9
	Strongly Agree	45	28.1	45	28.1	160	100.0
	Total	160	100.0	160	100.0		

Table 6. Impact of Pharmacist Consultation on Patients' Medication Attitudes

		N	Percent	Valid N	Valid Percent	Cumulative N	Cumulative Percent
Valid	Strongly Disagree	9	5.6	9	5.6	9	5.6
	Disagree	8	5.0	8	5.0	17	10.6
	Neutral	38	23.8	38	23.8	55	34.4
	Agree	69	43.1	69	43.1	124	77.5
	Strongly Agree	36	22.5	36	22.5	160	100.0
	Total	160	100.0	160	100.0		

the patient's perspective, and to propose solutions if necessary. The MUR is specifically intended for patients who have been prescribed multiple medications. These consultations occur in the pharmacy annually, or twice a year for patients taking more than four different medications[13,14, 15].

A substantial body of peer reviewed literature highlights the effectiveness of medication reviews conducted by pharmacists. Systematic reviews consistently report positive outcomes, such as reduced health issues, improved medication adherence, and enhanced quality of life[16]. However, these services are not available in many countries, and the role of pharmacists in medication adherence remains unclear in those regions. Cyprus is among these countries, where the role of pharmacists in medication adherence has not been established, and no government services have been developed to address the issue of medication non-adherence.

Therefore, this study aimed to investigate medication adherence among chronic patients in Cyprus and assess how factors such as adverse reactions, absence of symptoms, and travel, impact adherence. Additionally, the study explored patients' attitudes toward Medication Use Reviews (MUR).

2.   Methods:

This study employed a cross-sectional survey de-sign, using a questionnaire to assess patient adher-ence to medication, their attitudes toward Medicines Use Review (MUR) services, and their trust in the role of pharmacists in Cyprus, where MUR services are not currently available.

Participants and Sampling:

The survey specifically targeted chronic patients on chronic therapy. Participants were recruited with the contribution of the Cyprus Federation of Patients' Associations (OSAK), which represents thousands of members and patients nationwide and serves as the umbrella organization for all patient associations in Cyprus. The inclusion criteria were as follows: 1) age 18 years or older; 2) diagnosed with one or more chronic diseases, 3) they receive chronic medications.

Study Sampling:

This study employed an open-access question-naire that was disseminated to an initial sample of 300 patients, with the sample size determined based on previous studies in Cyprus that estimated a re-sponse rate of 55%. The survey was conducted us-ing Google Forms and remained open for responses from November 2023 to December 2023. To enhance participation, two rounds of reminders were sent

following the initial invitation. Anonymity was ensured throughout the process, and participants were informed of their right to withdraw consent at any time. This approach facilitated random voluntary responses, minimizing selection bias and enhancing the representativeness of the data within the accessible population.

Data Collection:

A questionnaire was developed following an extensive literature search, as well as a review of various existing questionnaires and scales related to patient adherence and the pharmacist's role in enhancing adherence and conducting Medication Use Reviews (MURs).

Considering the unique context in Cyprus, where pharmacists have limited roles in promoting medication adherence and pharmacy-led services are not widely available, the existing questionnaires were not entirely applicable to the Cypriot setting. Several instruments considered for the development of the questionnaire[17, 18, 19, 20].

This cross-sectional study utilized a questionnaire as the primary data collection tool, which underwent a pilot test to ensure its reliability and validity before full implementation. The pilot study was conducted with a small sample representative of the study population to identify any ambiguities or issues with the questionnaire's structure, wording, and clarity. Based on the feedback and results from the pilot test, necessary adjustments were made to refine the instrument, ensuring that it effectively captured the relevant data for the study objectives. This process helped enhance the accuracy and overall quality of the final questionnaire.

Questionnaire:

The questionnaire (Supplement 1 S1) was divided into two sections, consisting of a total of 17 questions. In addition to these questions, demographic information such as age, gender, and category of chronic illness was collected. The first section focused on patient adherence, while the second examined the pharmacist's role in Medicines Use Review (MUR). Participants responded using a 5-point Likert scale, with options ranging from Strongly Disagree to Strongly Agree, or from Never to Always, depending on the question. The only exception was question 16, which required a Yes or No response to determine whether participants believed the information provided about the MUR service would be useful in the context of Cyprus. If they answered Yes, they could then proceed to the final question.

Section A- Chronic Patients Medication Adherence:

Participants were inquired about their current medication use and the factors contributing to non-adherence. Specifically, they were asked about behaviors such as discontinuing or reducing medication due to side effects, stopping medication when symptoms are controlled, and forgetting to take medication while traveling. Additionally, participants were asked whether they consider taking medication as part of their daily routine, how often they feel inconvenienced by adhering to their medication regimen, and how frequently they forget to take all their prescribed medications.

Section B- Attitudes towards MUR and pharmacist's interventions:

Initially, participants were asked if they felt comfortable discussing their medications with a pharmacist. They were then questioned on whether receiving information from a pharmacist would enhance their understanding of medication adherence. Specific questions explored their willingness to engage in a 15-minute discussion about their medication and whether this would positively influence their attitude towards it, reflecting the typical duration of such reviews (NHS). Participants were also asked if receiving reminder messages from the pharmacy for medication supply would improve adherence and whether they would use an app for medication management. Finally, participants were asked about the perceived usefulness of the MUR service and whether they

would be willing to share their health data with the pharmacist if they found the service beneficial.

Ethical Approval

The questionnaire received approval from the Cyprus National Bioethics Committee (ΕΕΒΚ ΟΠ 2023.01.262). Participation in the research was voluntary and anonymous. Before completing the questionnaire, participants were provided with detailed information about the study and their involvement, and they gave their informed consent to participate.

Descriptive statistical Analysis

The data collected from participant responses were analyzed using SPSS 29.0® software. The analysis included calculating the frequency, mean, and standard deviation of responses for each question.

3.   Results

3.1. Demographics and Clinical Characteristics

A total of 160 patients participated in the study, consisting of 54 men (33.8%) and 106 women (66.3%) (Table 1). The age distribution of participants was as follows: 18-24 years (11.3%), 25-34 years (14.4%), 35-44 years (8.8%), 45-54 years (20.6%), 55-64 years (20.0%), and 65 years or older (25.0%).

In terms of disease categories, 44 participants had cardiovascular diseases (27.5%), 38 had endocrine disorders (24.4%), 18 had rheumatoid conditions (11.3%), 15 had respiratory diseases (9.4%), 13 had neurological conditions (8.1%), 6 had hemoglobinopathies (3.8%), and 25 reported other types of diseases (15.5%).

3.2. Medication Adherence:

Ninety-two percent of participants consider taking medication as part of their daily routine, with 104 (65%) strongly agreeing and 44 (27.5%) agreeing with this view. A neutral answer was given by 9 (5.6%) participants, and 3 (1.9%) disagreed (see Supplementary Material S2). None of the participants selected "Strongly Disagree."

Regarding the adherence in taking medications as prescribed over the past three weeks, 105 (65.6%) responded with "Strongly Agree," 42 (26.3%) with "Agree," 6 (3.8%) with "Neutral," 6 (3.8%) with "Disagree," and only 1 (0.6%) with "Strongly Disagree" (see Supplementary Material S3).

For taking medication at the specified time, 67 (41.9%) participants answered, "Strongly Agree," 63 (39.4%) "Agree," 21 (13.1%) "Neutral," and 9 (5.6%) "Disagree." No participants selected "Strongly Disagree" for taking medication at the scheduled time (see Supplementary Material S4).

A total of 75 participants (46.7%) reported "Never" or "Rarely" having difficulty remembering to take all their medications. Meanwhile, 36 participants (22.5%) reported this issue "Occasionally," and 35 (21.9%) said they "Sometimes" had trouble. Additionally, 11 participants (6.9%) "Usually" struggled to remember, and 3 (1.9%) reported "Always" having difficulty. (see Supplementary Material S5). When asked about forgetting to take medication while away from home or traveling, 99 (61.9%) answered "Never" or "Rarely," 37 (23.1%) "Occasionally," 15 (9.4%) "Sometimes," 7 (4.4%) "Usually," and 2 (1.3%) "Always" (see Supplementary Material S6).

Regarding medication discontinuation due to adverse effects, 113 participants (70.6%) reported "Never" or "Rarely" stopping their medications for this reason. In contrast, 28 participants (17.5%) reported discontinuing medication "Occasionally," 10 (6.3%) "Sometimes," 8 (5%) "Usually," and only 1 (0.6%) responded "Always" (see Supplementary Material S7). When asked about discontinuing medication when symptoms are under control, 121 participants (75.6%) reported "Never" or "Rarely" doing so. In comparison, 17 (10.6%) reported stopping medication "Occasionally," 9 (5.6%) "Sometimes," 11 (6.9%) "Usually," and 2 (1.3%) "Always". (see Supplementary Material S8).

Regarding the inconvenience of adhering to medication treatment, 68 (42.5%) reported "Never" or "Rarely" feeling uncomfortable, while 46 (28.7%) said they feel discomfort "Occasionally." Additionally, 25 (15.6%) reported feeling discomfort "Sometimes," 15 (9.4%) "Usually," and 6 (3.8%) "Always"

experienced discomfort in maintaining medication adherence (see Supplementary Material S9).

3.3. Attitudes towards MUR:

Most patients feel comfortable discussing their medication with the pharmacist, with 73 (45.6%) "Strongly Agreeing" and 66 (41.3%) "Agreeing." Meanwhile, 16 (10%) responded as "Neutral," and only 5 (3.1%) indicated that they do not feel comfortable discussing medication-related issues with the pharmacist (see Supplementary Material S10).

Additionally, 76.9% of participants believe that receiving information from the pharmacist about their medication and condition would help them better understand the importance of medication adherence, with 61 (38.1%) "Strongly Agreeing" and 62 (38.8%) "Agreeing." Meanwhile, 25 (15.6%) remained neutral, and 12 (7.5%) felt that such information would not enhance their understanding of why adherence is important (Table 4).

Regarding the willingness to participate in a potential 15-minute Medicines Use Review, 75% of participants expressed willingness, with 45 (28.1%) "Strongly Agreeing" and 75 (46.9%) "Agreeing." Meanwhile, 23 (14.4%) remained neutral, and 17 (10.6%) indicated they are not willing to participate in such a service (6.3% "Disagree" and 4.4% "Strongly Disagree") (Table 5).

Moreover, 65.6% of participants believed that their attitude towards medication would improve after a Medicines Use Review, with 36 (22.5%) "Strongly Agreeing" and 69 (43.1%) "Agreeing." Conversely, 17 (10.6%) participants felt their attitude would not improve, with 8 (5.0%) "Disagreeing" and 9 (5.6%) "Strongly Disagreeing." The remaining 38 (23.8%) were neutral (see Supplementary Material S11).

According to 128 (80.1%) participants, receiving medication reminder messages would improve their adherence, with 74 (46.3%) "Strongly Agreeing" and 54 (33.8%) "Agreeing." Meanwhile, 23 (14.4%) responded "Neutral," 7 (4.4%) "Disagreeing" and 2 (1.3%) "Strongly Disagreeing" (see Supplementary Material S12).

Regarding the use of an app to remind and record medication intake, 85.6% of participants expressed

willingness to use such an app, with 67 (41.9%) "Strongly Agreeing" and 72 (45%) "Agreeing." Meanwhile, 14 (8.8%) were "Neutral," and 4.4% indicated they would not use the app, with 5 (3.1%) "Disagreeing" and 2 (1.3%) "Strongly Disagreeing" (see Supplementary Material S13). Additionally, 83.1% believe that using the app would make it easier to remember to take their medications, with 63 (39.4%) "Strongly Agreeing" and 70 (43.8%) "Agreeing." Conversely, 6.3% felt the app would not be helpful (4.4% "Disagreeing" and 1.9% "Strongly Disagreeing"), while 17 (10.6%) were "Neutral" (see Supplementary Material S14).

Finally, regarding the usefulness of the Medicines Use Review service, 147 (91.9%) participants find it useful, while only 13 (8.1%) do not. Among those who view the service as useful, 80.3% are willing to share their health data with the pharmacist during the 15-minute discussion, with 40 (27.2%) "Strongly Agreeing" and 78 (53.1%) "Agreeing." (Table 6). Meanwhile, 22 (15%) were "Neutral," and 7 (4.8%) were unwilling to share their health data (Table 6).

4.   Discussion:

4.1. Medication Adherence among Cypriot Patients:

The adherence of chronic patients in Cyprus is generally satisfactory. Most of the patients report taking their medication at the prescribed dose and time, thus integrating it in their daily routine. Notably, patients with cardiovascular disease demonstrate the highest levels of adherence to their drug therapy. In contrast, patients with rheumatism and hemoglobinopathies often face challenges in maintaining their medication regimens, possibly due to the need for hospital visits to fill their prescriptions.

Notably, non-adherence is more prevalent among younger patients, particularly those in the 18-24 and 25-34 age groups. Research shows that younger individuals are less adherent to treatment compared to older populations. For instance, a study by Ge et al. (2023) found higher rates of non-adherence among younger patients than among their older counterparts[21]. Hypertensive patients in their 20s and 30s

are 10 to 12 times more likely to be non-adherent with antihypertensive medication compared to those aged 50 and older. The primary reasons for non-adherence in this younger cohort include fear of drug dependence, concerns about long-term effects, the desire to avoid side effects, forgetfulness and difficulties with timing. Similarly, Kim et al. (2019) reported that adherence was lowest in the 20-39 age group, progressively increased with age, peaked in the 60-69 age group, and then declined in those aged 70 and older[22]. The latter aligns with several studies[23, 24]. which have also found that advanced age is associated with decreased medication adherence.

4.2. Factors that lead to non-adherence:

Several factors contribute to non-adherence among patients. Specifically, 29.4% of the participants in this study reported stopping or reducing their medication due to adverse effects without consulting their doctor. This aligns with findings from another study involving diabetics, where concerns about medication safety, particularly regarding adverse drug reactions, led participants to alter or discontinue their medications[25]. Additionally, 24.4% of participants in the present study reported stopping their medication when their symptoms are under control. This behavior is particularly common among patients with respiratory and endocrine diseases. For instance, two-thirds of patients with respiratory conditions stop their medication when their symptoms are controlled. A study by Amin et al. (2020) found that many asthmatic patients, when asymptomatic, doubted the accuracy of their diagnosis and consequently had low adherence to their prescribed daily therapy[26]. Another factor contributing to non-compliance is the absence of patients from home. Specifically, 38.2% of participants reported forgetting to take their medications when they are away from home or traveling.

4.3. Patients' Attitudes Towards Medicines Use Review.

Most patients express a willingness to participate in a potential Medicine Use Review service, with 81.6% believing that such a service would improve their attitude towards medication. Among those who think that information from a pharmacist would help them understand the importance of medication adherence, 85.4% also believe that their attitude towards medication would improve after a review.

However, the service's perceived usefulness varies by age and gender. Among those who do not find the service useful, 53% are aged 18-24 or 25-34, and the majority are men (61.5%). Additionally, 50% of those who do not find the service useful are not willing to participate in a 15-minute discussion and do not believe their attitude towards medication would change as a result.

Surveys conducted in the UK and Spain, where MUR services are offered by pharmacists, show high levels of satisfaction. Specifically, 98.5% of patients in Spain and 97% in the UK reported being very satisfied with the MUR service they received. Patients in these countries highlighted several advantages of the service, including a better understanding of their medications, effective resolution of health issues, increased awareness of the necessity of adhering to prescribed treatments, information on potential side effects, and overall improvement in medication adherence[16, 27].

4.4. Attitudes towards the use of an application:

As mentioned earlier, most patients indicated they would use an app to remind and record medication intake. Interestingly, 85% of those who would not use the app were men, and similarly, 80% of those who felt the app would not be useful were also male. Additionally, 84.7% of participants who reported difficulty remembering to take their medications believed that using the app would help them remember better.

While mobile apps have the potential to enhance the efficiency and reduce the costs of traditional medication adherence interventions, their effectiveness remains largely untested. Most existing studies have been conducted in highly controlled clinical settings and over short durations. This highlights the need for longer-term research to evaluate the integration of these apps into patients' daily routines and

their impact on long-term treatment adherence[28].

Moreover, according to research by Santos et al. (2016), most available medication reminder apps are considered of poor quality due to their difficulty in use and setup, making it challenging even for healthcare professionals to recommend reliable apps to patients[29]. However, there are some apps with promising features that warrant further study to assess their effectiveness in improving patient compliance.

4.5. Pharmacist's Role in Medicines Use Review

The results of this study suggest that pharmacists could effectively provide Medicines Use Review (MUR) services, as most participants feel comfortable discussing their medications with pharmacists and believe that receiving information from them would improve their understanding of adherence. It is evident that patients generally trust pharmacists for MURs, with the majority willing to participate in and recognizing the value of such discussions. However, some participants remain uncomfortable with pharmacists or are hesitant to engage in MURs.

In the UK, Hindi et al. (2018) found that many people are unaware of the extended services offered by pharmacies, viewing them mainly as places to purchase medications or receive advice on minor health issues[30]. A survey by Krska et al. (2016) revealed that 18.2% of the UK public did not know about the MUR service, but over 70% expected these services to be beneficial, believing that pharmacists could help them understand and use their medications more effectively[31].

In many regions, including North America, Europe, and the Middle East, doctors are often seen as the primary authority in healthcare, leading to a greater trust in them over pharmacists for health services. The patient-physician relationship significantly influences attitudes towards pharmacists; positive experiences with physicians can reduce the perceived need for pharmacist advice, and vice versa.

It is vital that patients, the public, and physicians recognize that pharmacists possess clinical skills that extend well beyond medication dispensing. Evidence suggests that pharmacists play a vital role in ensuring proper medication use, with many patients expressing satisfaction with MUR services. Additionally, pharmacies offer the advantage of accessibility, allowing patients to receive health services quickly and conveniently[30].

5. Conclusion:

The adherence of chronic patients in Cyprus to their pharmaceutical treatments is generally satisfactory. However, common reasons for non-adherence, such as adverse effects and the absence of symptoms, lead some patients to reduce or stop their medication, even among those with otherwise good adherence. It is noteworthy that even patients with excellent adherence express willingness to participate in a MUR and believe they would benefit from it. This highlights a crucial point: patients who adhere well to their medication may still lack understanding about the purpose of their medication and the importance of adherence.

Most patients feel comfortable discussing their medication with a pharmacist and trust the pharmacist in the context of a potential Medicines Use Review service. Therefore, it is important to educate the public about pharmacists' clinical skills and to establish such a service in Cyprus. This would help inform patients about the correct use of medications and improve overall medication management.

Data access statement: All authors had full access to the data used in this study. NA, and CP as the primary researchers, had direct access to the raw data during collection and analysis. Data access is currently ongoing and securely stored for verification and future reference, in accordance with institutional and ethical guidelines. As per regulatory requirements, the data will be retained for a period of two years.

Data availability statement: The data underlying this article are available in the article and in its online supplementary material.

WHO	World Health Organisation
NICE	National Institute for Health and Care Excellence
FIP	International Pharmaceutical Federation
NHS	National Health Service
OSAK	Cyprus Federation of Patients' Associations

Supplementary Material

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