

# Perceived Satisfaction and Outcomes from Drug Information Center Services Provided with a Telehealth Approach

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**ABSTRACT**

**Background and Aim:** Telehealth expansion is dependent on the acceptance and satisfaction of the providers and users of the telehealth service and the impact on the overall health-care system. This study was conducted to evaluate the outcome of pharmacist-led telehealth services and satisfaction of their users. **Materials and Methods:** The telehealth-based drug information center service was an 8-month retrospective, descriptive study that evaluated users' service satisfaction (quality of service), general health outcomes, recommendations, and personal health outcomes by electronically distributing a questionnaire to the users using a Donabedian model approach. **Results:** The feedback response rate was 87.33% ( $N = 131$ ). The majority of users were 25–34-year-old young adults, while regarding the background status of the enquirers (health-care worker, medical doctor, nurse, patient, pharmacist, practitioner/scientist), 35 (26.7%) pharmacists and 34 (26.0%) patients were the most prevalent users. In terms of service satisfaction and health outcome, medical doctors had the highest mean ratings of  $4.67 \pm 0.76$  and  $4.95 \pm 0.21$ , respectively. Evaluation of the pharmacist-led telehealth impact was measured with four variables, which showed a statistical significance of  $P < 0.001$  and a highly positive mean rating generally (service satisfaction  $4.44 \pm 0.83$ , general health outcome  $4.54 \pm 0.85$ , personal health outcome  $4.80 \pm 0.58$ , and recommendation  $4.85 \pm 0.43$ ). The findings also showed that user satisfaction significantly impacted on personal health outcomes ( $P < 0.001$ ), and that there was an insignificant relationship between user background status and continents. **Conclusions:** The study reveals the significant impact of pharmacist-led telehealth services and the importance of incorporating telehealth services into drug information centers.

**KEYWORDS:** Drug information service, patient satisfaction, personal health outcome, pharmacist led, telehealth

## INTRODUCTION

Telehealth is the use of Information and Communication Technologies (ICT) to bridge the physical distance between patients and health-care providers.<sup>[1,2]</sup> Technology has increased the documentation and quality of complex diagnosis, treatment, and patient care processes. In-service training of health professionals has been carried out for centuries through face-to-face master–apprentice training. With the increasing complexity of health conditions and aging populations, telehealth can be the key to many unmet

needs in health and related services.<sup>[3]</sup> The provision of drug information (DI) to health-care professionals, the public, and patients is a key role of all pharmacists, according to the American Society of Health-System Pharmacists (ASHP).<sup>[2,4,5]</sup>

Drug information centers (DICs) are situated centers that give unbiased technical and scientific information

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about drugs to health-care practitioners and the general public in an objective and timely way.<sup>[6]</sup> Provision of DI to health-care professionals and patients is a core factor of all pharmacists through the DI service to ensure the optimization, quality, and efficacy of the medication, as well as the lowering of errors and prevention of adverse drug reactions. The ASHP states that the provision of DI to health-care professionals and patients is a key competency of all pharmacists through the DI service.<sup>[7-9]</sup> The World Health Organization (WHO) highlights the importance of ensuring global access to high-quality health care however medicines accounted for 15.2% of global health spending in 2000, and abuse is a major global problem that is both wasteful and harmful.<sup>[10]</sup> One of the crucial challenges globally in the 21<sup>st</sup> century is ensuring universal access to high-quality health-care services.<sup>[11,12]</sup> Telemedicine may be an economically viable option for both developed and developing countries, while it also fulfills the DIC programs' aim to the optimal.<sup>[13,14]</sup> Meanwhile, the recent pandemic outbreak, coronavirus disease-2019 (COVID-19), changed our habits of ICT use and health-care visits.<sup>[15,16]</sup>

Telehealth expansion is dependent on the acceptance and satisfaction of the providers and users of the telehealth service and the impact on the overall health-care system.<sup>[11]</sup> Evaluating telehealth services can be challenging because it is ever evolving and erupting, but it is the most sensible first step when initiating a telehealth service. The satisfaction of users and the impact on the overall health-care system are important factors to consider before and after launching a telemedicine service.

This study was conducted to evaluate the impact of pharmacist-led telehealth services and the satisfaction of their users, health professionals, and patients. Additionally, the effect of telehealth on DI service was determined.

## MATERIALS AND METHODS

Telehealth-based DIC service was an 8-month retrospective, descriptive study that evaluated user satisfaction and outcomes by electronically distributing a questionnaire to the users, after responding to questions received via the application on the center's website (<https://www.ciu.edu.tr/en/drug-information-center>), for the period of July 2021–March 2022. For evaluating telehealth health services and assessing the quality of health care, a Donabedian model approach was used.<sup>[17]</sup> Two sets of online questionnaires were used to receive new and follow-up drug enquiries. The user's feedback survey questionnaires were designed following Parmanto *et al.*'s<sup>[18]</sup> recent development of a telehealth evaluation questionnaire called the Telehealth

Usability Questionnaire (TUQ), which was tested for reliability in each phase. The analyses implied that the TUQ is a solid, robust, and versatile measure. It is also based on the most up-to-date usability questionnaires and is capable of responding to the most recent technological advancements in telehealth. The TUQ is a comprehensive questionnaire that assesses all aspects of usability, including usefulness, ease of use, effectiveness, reliability, and satisfaction. Similar to the provider's questionnaire, it was prepared following the Food and Drug Administration's (FDA) prescription drug labeling guidelines.<sup>[19,20]</sup> Users completed the questionnaire anonymously, which consisted of 24 questions with six sections: 1) demographic details, 2) service satisfaction (SSF), 3) general health outcome (GHO), 4) personal health outcome (PHO), 5) concept of the users about telehealth service, and 6) comment or suggestion by the respondents. It included open-ended and closed-ended questions. All feedback questionnaires received during this study period were evaluated. Exclusion criteria included those who refused consent to participate in the survey and questions received that were out of DIC scope. Only those who met the inclusion criteria were included ( $N = 131$ ).

A total of 150 enquiries got submitted via the center's website. The response/intervention was prepared using scientific evidence-based research practice steps and sent to the enquirer via email with a link to the online feedback survey. Among 150 pupil enquirers, only 131 (87.33%) users filled out the feedback survey questionnaire form and met the inclusion criteria. Written informed consent was obtained from each participant. They were also informed about the study's objectives. The research was carried out at the newly situated university DIC (CIU-DIC) service under the clinical pharmacy department, provided by four clinical pharmacy postgraduates under the supervision of a DIC manager with a doctorate in clinical pharmacy. To answer the DI queries, a minimum of two to three sources of information were used, referring to the most up-to-date literature searches of primary source, secondary source, tertiary source, and others, such as Drugs.com, Lexicomp Online, Cochrane Library, and RxList Database.<sup>[21,22]</sup>

## Ethics approval

This research was approved by the University Scientific Research and Publication Ethics Committee (EKK 21-22/04/009) on 07.11.2021.

## Statistical analysis

Internal consistency (Cronbach's alpha) was used to test the surveys' reliability, which assesses how well each item corresponds with other items on the scale (or

construct) as well as the overall scale score. Internal consistency dependability measured by Cronbach's alpha is regarded as acceptable if it is  $\geq 0.70$ .<sup>[23]</sup> Frequency was employed to verify variable consistency, accuracy, and missed values. Descriptive statistics were looked at to statistically assess the sociodemographic characteristics of telehealth service users to determine which populations use the service the most and what their outcomes are. Six status categories were used to categorize the queries that were received (medical doctors, nurses, pharmacists, patients, scientists, and health-care workers). The highest and lowest mean ratings were recorded for telehealth SSF, GHO, and recommendation (REC) and PHO of the enquirer based on status. Based on data provided by users, the association between user status and the continent was examined using the Chi-square statistical analysis. Regression and bivariate correlation models were employed to assess the significant relationship between the users' age group, continent, SSF, GHO, PHO, and REC. PHO was based on the capacity to take control of personal health by consciously choosing to be healthy after receiving a telehealth intervention. Also, general health assesses the overall state of the body's health.<sup>[24]</sup> The primary health information needs of service users were determined using the FDA's medication labeling type categorization.<sup>[19,20]</sup> Statistical significance was defined as a *P* value less than 0.01. All the data were evaluated and examined in the Statistical Package for the Social Sciences (SPSS, version 25) and in Excel. These methods were employed to accurately find out statistically significant results. Results are presented in descriptive analysis form in tables, chats, and figures.

## RESULTS

### Demographic variables

Among the 131 individuals who met the inclusion criteria, the majority of users were men (67, 51.1%) and the remaining were women (55, 42.0%). The majority of users were 25–34-year-old young adults. Europe, Africa, and Asia accounted for the majority of DIC telehealth users (41, 31.3%; 33, 25.2%; and 22, 16.8%, respectively). Furthermore, 35 (26.7%) users are pharmacists, while 34 (26.0%) were patients. The types of DI requests were multi-selective. Some enquiry questions had more than one category, with a high number of requests from drug description request (54, 12%), warnings and precautions (47, 11%), and patient counseling information (44, 10%) [Table 1].

### Evaluation of impact variables

To evaluate the outcome of the pharmacist-led DIC telehealth service after 8 months of providing service, the mean rating, correlation, and regression analysis of the

feedback survey were analyzed to test for the assessment and significance of these variables: SSF (quality of service), GHO, REC, and PHO [Tables 2 and 3].

In terms of SSF and PHO, medical doctors had the highest mean ratings of  $4.67 \pm 0.76$  and  $4.95 \pm 0.21$ , respectively.

**Table 1: Users' demographic characteristics (n=131)**

	<i>n</i>	%		
Age (years)				
18-24	22	16.8		
25-34	39	29.8		
35-44	27	20.6		
45-54	28	21.4		
55 and above	15	11.5		
Gender				
Male	67	51.1		
Female	55	42.0		
Prefer not to say	9	6.9		
	<i>n</i>	%	Male	Female
Enquirer's continent				
Africa	33	25.2	14	18
Antarctica	3	2.3	2	1
Asia	22	16.8	15	7
Australia	7	5.3	3	4
Europe	41	31.3	18	20
North America	11	8.4	9	0
South America	14	10.7	6	5
Enquirer's status background				
Health-care worker	10	7.6		
Medical doctor	22	16.8		
Nurse	18	13.7		
Patient	34	26.0		
Pharmacist	35	26.7		
Practitioners/scientists	12	9.2		
Multi-selective types of drug information requests				
Indications and usage	38	9		
Dosage and administration	19	5		
Dosage forms and strengths	13	3		
Contraindications	33	8		
Warnings and precautions	47	11		
Adverse reactions	23	6		
Drug interactions	23	6		
Pregnancy	17	4		
Drug abuse and dependence	7	2		
Overdosage	9	2		
Description	54	12		
Clinical pharmacology (pharmacokinetics, pharmacodynamics)	11	3		
Nonclinical toxicology (carcinogenesis, mutagenesis, fertility)	11	3		
Clinical studies	19	5		
References	20	5		
Supplied/storage and handling	16	4		
Patient counseling information	44	10		
Phytomedicine (herbal supplements)	7	2		

Practitioners/scientists had a high mean rating in GHO at  $4.83 \pm 0.39$ , PHO at 5.00, and in REC at 5.00, while in general, SSF, GHO, PHO, and REC showed a positive mean rating of 4.4, 4.5, 4.9, and 4.8, respectively. A one-way analysis of variance (ANOVA) was used to see if there was a statistically significant variation in the enquirer feedback response ratings based on their status. According to the results, there was no statistically significant difference ( $F_{(5,125)} = 0.868, P = 0.505$ ). This entails that enquirer feedback ratings do not differ in terms of SSF, GHO, PHO, and REC based on status [Table 2].

The evaluation tested if SSF had a significant impact on health outcomes and on general health, and it was analyzed separately whether general health influenced

telehealth service REC. The dependent variables PHO, GHO, and REC were regressed on the predictive variables SSF and GHO, respectively, to determine the outcome. Firstly, SSF significantly predicted PHO ( $F_{(1,129)} = 109.048, P < 0.001$ ). This indicates that SSF plays a significant role in the quality of PHO ( $b = 0.355, P < 0.001$ ). The results indicate the positive effect of SSF. Moreover,  $R^2 = 0.458$  describes that the model explains 45.8% of the variance in PHO. Secondly, SSF significantly predicted GHO ( $F_{(1,129)} = 132.286, P < 0.001$ ), which indicates that the SSF plays a significant role in the outcome of GHO ( $b = 0.729, P < 0.001$ ). The results direct the positive impact of SSF. Moreover,  $R^2 = 0.506$  represents that the study explains 50.6% of the variance in GHO. Lastly, on regression analysis, GHO significantly predicted REC ( $F_{(1,129)} = 53.115, P < 0.001$ ), which indicates that the GHO significantly influences telehealth users' REC ( $b = 0.270, P < 0.001$ ). The results statistically indicate the positive effect of GHO. Moreover,  $R^2 = 0.292$  depicts that the model explains 29.2% of the variance in REC [Table 3].

The association between the variables in determining the effect of pharmacist-led telehealth services was examined by correlation analysis. Pearson's product correlation of SSF and GHO was found to be moderately positive and statistically significant ( $r = 0.540, P < 0.001$ ). This shows that SSF leads to positive GHO [Table 3].

Cross-tab analysis was followed by a Chi-square statistical test to examine the associations between

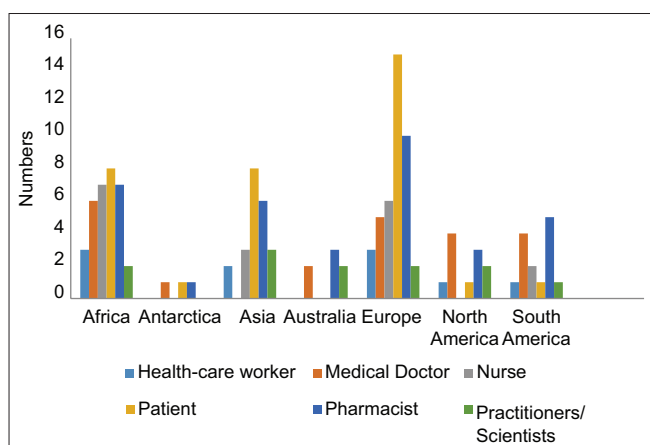


Figure 1: A cross-tab analysis between user's status and continent

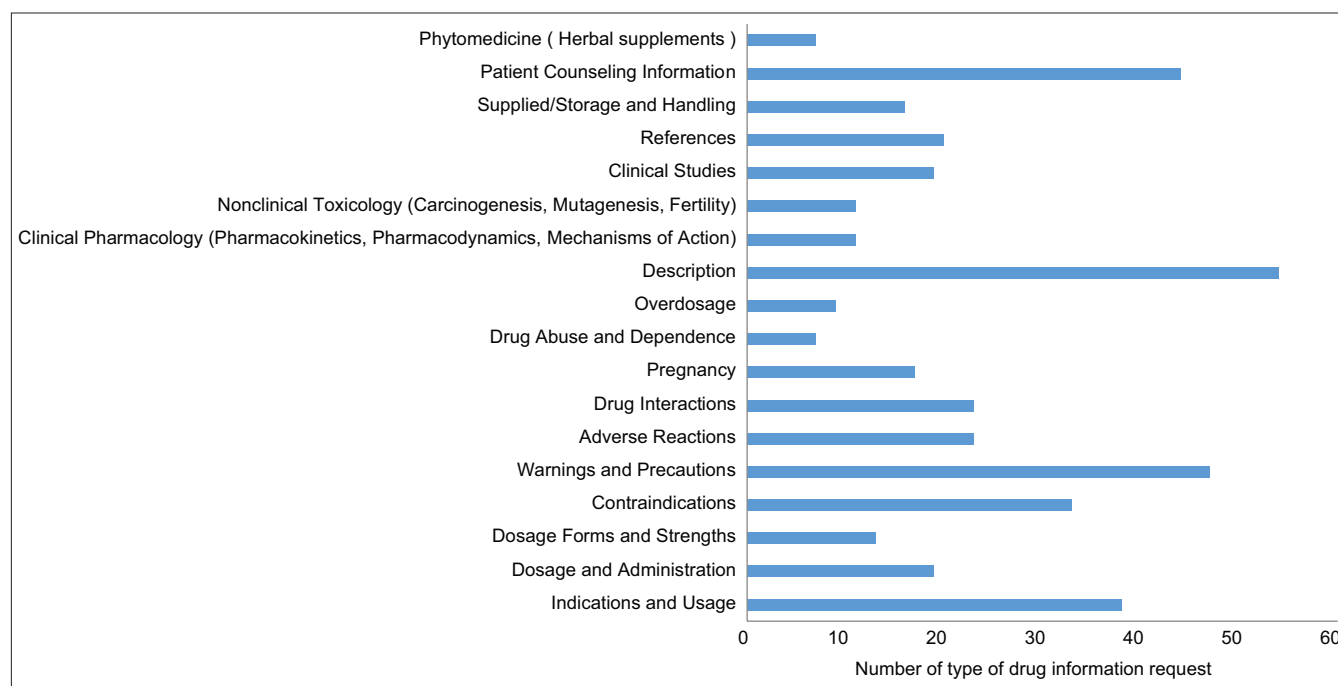


Figure 2: Distribution of type of drug information request in numbers. The bars illustrate the documented type of drug information request by DIC telehealth users. DIC = drug information center

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**Table 2: Mean ratings of telehealth SSD, GHO, REC, and PHO of the enquirer based on status**

Enquirer status	Mean	Std. deviation
<b>SSF</b>		
Health-care worker	4.26	1.01
Medical doctor	4.67	0.76
Nurse	4.64	0.44
Pharmacist	4.30	1.02
Patient	4.38	0.87
Practitioners/scientists	4.48	0.45
Total	4.44	0.83
<b>GHO</b>		
Health-care worker	4.70	0.67
Medical doctor	4.63	0.78
Nurse	4.56	0.92
Pharmacist	4.37	1.00
Patient	4.50	0.86
Practitioners/scientists	4.83	0.39
Total	4.54	0.85
<b>PHO</b>		
Health-care worker	4.70	0.67
Medical doctor	4.95	0.21
Nurse	4.89	0.32
Pharmacist	4.84	0.45
Patient	4.80	0.58
Practitioners/scientists	5.00	0.00
Total	4.87	0.44
<b>REC</b>		
Health-care worker	4.90	0.32
Medical doctor	4.77	0.61
Nurse	4.86	0.33
Pharmacist	4.88	0.40
Patient	4.82	0.46
Practitioners/scientists	5.00	0.00
Total	4.85	0.43

GHO=general health outcome, PHO=personal health outcome, REC=recommendation, SSF=service satisfaction. Ratings: 5=very satisfied, totally objective; 4=satisfied, objective; 2=neutral, somewhat objective; 3=dissatisfied, nonobjective; 1=very dissatisfied, totally nonobjective

**Table 3: Correlation and regression analysis of the impact of pharmacist-led telehealth service**

	SSF	GHO	PHO	REC
SSF	1			
GHO	0.712**	1		
PHO	0.677**	0.614**	1	
REC	0.542**	0.540**	0.686**	1
Regression weight	Beta coefficient	R <sup>2</sup>	F	P
SSF→PHO	0.355	0.458	109.048	<0.001
SSF→GHO	0.729	0.506	132.286	<0.001
GHO→REC	0.270	0.292	53.115	<0.001

GHO=general health outcome, PHO=personal health outcome, REC=recommendation, SSF=service satisfaction. P<0.05.

\*\*Correlation is significant at the 0.01 level (two-tailed)

categorical variables (user’s status and continent, health outcome, and user status). The results showed an insignificant association at 5% significance level between the two paired variables ( $\chi^2 = 29.384$ , degree of freedom [df] = 30,  $P = 0.497$  and  $\chi^2 = 17.315$ , df = 20,  $P = 0.0632$ , respectively). Therefore, the result indicates that the variables are statistically insignificant [Figure 1 and Table 4].

**DISCUSSION**

It is beyond dispute that evaluating user satisfaction and quality standards of telehealth service should be a priority and precondition for assurance of evidence-based treatment outcomes, especially for newly situated or developing services. The purpose of this research study was to evaluate users’ satisfaction with the newly situated CIU-DIC Telehealth Service provided by four clinical pharmacy postgraduates under the supervision of a DIC manager with a doctorate in clinical pharmacy.

A total of 150 enquiries were processed between July 2021 and March 2022. However, only 131 telehealth users responded to the online feedback survey included in the analysis, as described in the “Materials and Methods” section. Enquiries were received from different continents with different statuses, characterized into six categories (health workers, doctors, nurses, pharmacists, patients, and practitioners/researchers). The majority of users are males (51.1%), with a high number of requests from Europe (most of which were young adults aged 25–34) [Table 1]. One of the key barriers to ICT and digitalization acceptance is the age group Yushau and Nannim<sup>[25]</sup> reported in their recent study about the reluctance of older adults to use ICT and a significant number of younger individuals showing greater interest in ICT use, which is similar to our users demographic outcome results.<sup>[26]</sup> Further, one-way ANOVA test was done between the impact variables (SSF, GHO, REC, and PHO) to check for significance, The finding revealed that there was a significant variation in the level of REC in the age group, while others were insignificant. It shows that younger adults show more interest in recommending telehealth services to others, whereas older age groups show less interest in recommending telehealth services to others. This means that younger age groups are susceptible to switching from traditional methods to accepting the telehealth service method. This is also consistent with the report of Kumar *et al.*<sup>[27]</sup> The success of telepharmacy is critical to end-user adoption. Cimperman *et al.* (2013) examined the important parameters that may indicate the effective implementation of home telemedicine services for older individuals, which included ease of use and usefulness, intended expectancy, social impact, and

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**Table 4: Associations between user's status and continent**

Continent to which the enquirer belongs	Health-care worker	Medical doctor	Nurse	Patient	Pharmacist	Practitioners/scientists	Total
Africa	3	6	7	8	7	2	33
Antarctica	0	1	0	1	1	0	3
Asia	2	0	3	8	6	3	22
Australia	0	2	0	0	3	2	7
Europe	3	5	6	15	10	2	41
North America	1	4	0	1	3	2	11
South America	1	4	2	1	5	1	14
Total	10	22	18	34	35	12	131

health impact.<sup>[26]</sup> Our research results showed high mean ratings ( $4.44 \pm 0.83$ ) in ease of use and health outcome, among others.

Gender inequality in health and ICT among women occurs in different geographic regions, but is more prevalent in developing countries. Telehealth can be used to close the gap in gender inequality and contribute to the achievement of the 2030 United Nations Sustainable Development Goal 5 (gender equality). Gender inequality in health care has had a substantial effect on the public, particularly in low-income countries, resulting in a disproportionately high rate of mortality among women, as seen in Asia.<sup>[28]</sup> Our research showed that male users were slightly higher in number than female users. However, the *t*-test results showed that there was no statistically significant difference between the impact ratings of male and female on satisfaction with telehealth services. The results of this study are consistent with those of previous studies.<sup>[29,30]</sup> However, they are in contrast to the results of Kruse *et al.*,<sup>[31]</sup> in which female respondents evaluated their health as lower than that of male respondents. The result outcomes of Hentati *et al.*<sup>[32]</sup> validate this.

Patient satisfaction is an indication of quality service and care. This has become a top priority for Medicare and telehealth services.<sup>[18]</sup> User satisfaction evaluations have been utilized by health-care centers, pharmaceutical services, and hospitals across the nation to not only evaluate and improve clinical care, but also help in planning the growth of services. Following the Donabedian three-component model of quality of care (structure, process, and outcome) for analysis in this study, four variables (SSF, GHO, REC, and PHO) were utilized to evaluate the impact of the pharmacist-led telehealth service in this research study. Our findings indicated high satisfaction and significant impact among 87.33% of telehealth users. This was consistent with many other satisfaction studies of telehealth users.<sup>[31,33]</sup>

Analysis of feedback from the enquirer status given in Table 2 showed pharmacists (35, 26.7%) and (patients

34, 26.0%) as the highest number of users. Results from the mean rating of the variables showed a slight difference in the mean, although no statistical significance was found after a one-way ANOVA was performed. Medical doctors showed the highest mean rating in SSF ( $4.67 \pm 0.76$ ). Practitioners/scientists showed the highest mean rating in GHO, PHO, and REC. This correlates with the finding of Gagnon *et al.*,<sup>[34]</sup> whose research evaluated physicians' interest in telehealth services because of the advantage of remote service, especially in rural regions. A study on medical residents in Quebec revealed a link between their positive views of telehealth and their desire to work in a remote setting.<sup>[35]</sup> Telehealth also aids physician practice by allowing for continuous medical education, peer relationships, and freedom to second opinions. Cohen *et al.*<sup>[36]</sup> revealed in their current study that telehealth is perceived by the majority of physicians and medical workers to improve health-care outcomes for the remote public, although most specialists have concerns about the p rognoses. At the hospital and health sector level, telehealth can help with the growth of regional reference centers, facilitate the retention of native expertise, and help in cost savings.<sup>[35]</sup> Before transporting a patient to an urban center, telehealth could be useful for patient monitoring and information transmission, easing case management and decreasing hospitalization.<sup>[13,37]</sup> The patient had a positive mean rating in recommendation to others and a positive health outcome, as shown by the regression analysis presented in Table 3. A satisfied patient will recommend the service to others. Patient satisfaction is defined by Pascoe<sup>[38]</sup> as a health-care recipient's reaction to key parts of his or her service experience. Our findings were found to be similar to those of a previous study which revealed that patients were the primary source of DI requests and gave a high outcome rate.<sup>[39,40]</sup> But our findings differ slightly in that there were more positive impacts rated in PHO among medical doctors, pharmacists, and nurses, with mean ratings of 4.95, 4.84, and 4.89, respectively, which reveals that medical practitioners such as pharmacists,

nurses, and doctors require rapid, scientifically unbiased telehealth service intervention for optimal evidence-based treatment. As evidenced by the statistical assessment in our results, health-care professionals' drug-related errors can be significantly minimized using telehealth services. Furthermore, rational drug usage and drug adherence can be promoted by enhancing the quality of health outcomes provided by telehealth services. Statistical significance ( $P < 0.001$ ) in SSF, PHO, and GHO among users in general health outcomes indicates users' interest in revisiting and willingness to recommend telehealth services Table 3.

Analysis of associations between user's status and continent, which is presented in Table 4 and Figure 1, shows that a high number of questions were received from Europe (41), with a high number of questions coming from the patients and pharmacists, which was closely followed by Africa (33) and Asia (22). Similar to Durrani and Khoja's<sup>[41]</sup> result, Asia showed an optimistic interest in telehealth growth. While in Europe, people are increasingly reliant on digital technologies and the Ministry of Health is investing more in digitalization, which explains the high level of enquiries received in our study from Europeans. According to a recent study, as technology evolves, life expectancy in Europe is expected to increase steadily.<sup>[42]</sup> Furthermore, the Chi-square statistical analysis result showed an insignificant association between the user's continent and the impact variables (SSF, GHO, REC, and PHO). According to the FDA's prescription labeling type categorization,<sup>[19,20]</sup> providers documented the type of DI needed by users [Figure 2]. Drug description and patient counseling information are the most frequently queried topics, followed by warnings/precautions, indications/usage, and contraindications. The high number of drug description and patient counseling information may be attributed to limited medication guidance and information at the point of drug dispensing and prescription, or decreased accessibility to medical doctor experts, or to the fact that pharmacists whom the general public usually consult for over-the-counter (OTC) drugs are overloaded with the dispensing drug.<sup>[43]</sup> Several factors, including perceptions about medications, have been observed to affect medication adherence and rational use of the drug.<sup>[44]</sup> Our study result shows that telehealth services for patients may increase adherence and other drug-related problems as requested by the users, similar to the result reported by a randomized controlled trial conducted by Omboni *et al.*<sup>[48]</sup> Clinical pharmacy services provided to hypertension patients enhance blood pressure control and boost adherence to antihypertensive treatment. Previous research papers focused on telehealth services provided by a single medical management

system and population<sup>[14,26,33,45,46]</sup> and telehealth services led by other healthcare professionals, such as nurses or doctors, with only a few pharmacist-led telehealth services documented,<sup>[47-49]</sup> whereas our study is strictly pharmacist led and covers all drug-related concerns following FDA's prescription labeling categorization plus phytomedicine (herbal supplements).

### Limitations

This study did not identify the opinions of the participants about the factors influencing the use of telehealth. Therefore, it is imperative to give these aspects additional consideration. This strategy will aid in improving the level of digital health acceptance in the health-care system among users. This study generalizes the specialties of pharmacists, without taking into account each specialty. The study does not take into account the participants' cultural perspectives toward telehealth.

### CONCLUSION

This study assessed the impact of pharmacist-led telehealth services, evaluating user satisfaction and health outcomes across various factors. Data analysis revealed a significant impact role for pharmacists in telehealth services, as well as high user satisfaction and a significant number of potential positive health outcomes with the willingness to recommend telehealth services. Importance of clinical pharmacists in future innovations such as telehealth can lead to a patient-centered discipline that is acknowledged for its contributions in improving pharmaceutical therapy outcomes.<sup>[36,50]</sup> Although health-care systems, academic institutions, and collaboration facilitate innovation, they are not fully utilizing the opportunity.<sup>[37,50,51]</sup> Telehealth could potentially be used to deliver care and in patient monitoring from different locations. To ensure user satisfaction, successful telehealth adoption necessitates appropriate continuous evaluation. Based on our study results, it can be concluded that quality telehealth service affects health outcomes and recommendations.

Furthermore, policymakers in every continent need to be aware of the advantage of the integration of telehealth in DI centers, clinical practices, and medical institutions. This includes user satisfaction to improve the quality of service, outcomes, and care. Further research studies should explore more on the comparison of the types of DI requests among users in developed and developing countries.

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The authors of this article also assure that they followed the journal publishing procedures, and they agree to publish it as any form of access article conforming to subscribe access standards and licensing.

### Authors' contributions

The first author was responsible for the conceptual construction of the study's idea and also handled the literature section and analysis, while the second author managed data gathering and preliminary analysis and was responsible for proofreading. The third author was responsible for manuscript editing.

### Ethical approval

The authors of the manuscript have agreed for authorship, read and approved the manuscript, and given consent for submission and subsequent publication of the manuscript. The research was approved by the CIU Scientific Research and Publication Ethics Committee (EKK 21-22/04/009).

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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### Conflicts of interest

There are no conflicts of interest.

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