ORIGINAL ARTICLE

Perceptions of Clients on a University-based Drug Information Service affecting Medication Safety

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ABSTRACT

Objectives. To assess the clients' perceptions of the UP College of Pharmacy (UPCP) Telepharmacy Service on their knowledge, decision-making, and medication safety.

Methods. The study employed a cross-sectional design administered through guided voice-call interviews using an online survey questionnaire as the data collection instrument. The inclusion criteria of the study were as follows: (1) must be at least 18 years old, (2) with no cognitive impairment, (3) must have sent a medication-related query in the UPCP Telepharmacy Service between October 2020 and July 2022, and (4) must be contacted through voice call platforms.

Results. A total of 72 respondents participated in the study. Majority were from 30 to 59-year-old age category (51.39%), females (72.22%), from Region IV-A (36.11%), college graduates (44.44%), and with average monthly income of below PhP 11,000 (47.22%). Overall, clients reported very positive perceptions on the drug information advice received ($\bar{X}$ 4.510) and were very satisfied with the service ($\bar{X}$ 4.625). They perceived that the advice influenced their decision-making about their medications ($\bar{X}$ 4.514) and increased their understanding of medication safety ($\bar{X}$ 4.522). Multiple regression analysis revealed that clients' perception on drug information advice is positively associated with perceived effect on decision-making ($r = 0.5033$; $p = 0.000$) and medication safety ($r = 0.4320$; $p = 0.004$).

Conclusion. The pharmacist-led drug information service, such as the UPCP Telepharmacy Service, is a helpful program to provide accurate and reliable medication information to clients who need them amidst the increasing accessibility of medical information on the internet. It can help improve knowledge of patients about appropriate use of medicines, drug interactions, and adverse drug reactions that will enable them to make informed decisions regarding their medications, identify the need to consult with healthcare providers, and ultimately ensure medication safety.

Keywords: telepharmacy, telehealth, drug information service, medication safety

INTRODUCTION

The COVID-19 pandemic has prompted healthcare professionals to deliver healthcare services in alternative platforms. Globally, telehealth services are being implemented by various institutions to ensure continuity of care among patients. An example of this telehealth service is telepharmacy, a subset of telemedicine which refers to the practice of using telecommunications technology to provide patient-care services and oversee pharmacy operations.[1] It allows pharmacists to provide services even when pharmacy resources are limited. One of the major activities in telepharmacy is the conduct of patient medication counselling and monitoring. Countries with telepharmacy services employ different mechanisms in implementing the service, examples are chat-based and telephone-based mechanisms in providing

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pharmaceutical care.[1,2] These telepharmacy services received positive feedback from healthcare professionals, patients, and their caregivers who availed of the individualized and tailored drug information advice. Studies that determined patient satisfaction in these services showed excellent ratings from many of the patients due to ease of accessing the services, accurate identification of the concern, and helpfulness of the advice given.[1,3] Patient opinion in several studies showed that the advice from drug information services were beneficial to their care, even if the information was used or not.[4] Overall, these established services have also been found to positively affect patient knowledge on medications and clinical outcomes.[1]

In the Philippines, various teleconsultation platforms such as by the Philippine Pharmacists Association which uses an online platform to communicate and give feedback to patients have also been piloted during the pandemic to increase access to care for patients who have limitations due to physical distancing measures implemented by the government[4], although there have been limited published literature documenting clients' perception of the service, and its effects on knowledge, decision-making, and medication safety.[5-8]

In July 2020, the College of Pharmacy, University of the Philippines Manila (UPCP) created its own telepharmacy, a university-based drug information service (DIS) which aimed to deliver evidence-based drug information to clients through an online platform by volunteer registered pharmacists and supervised pharmacy students. It uses a Google Form where clients can send queries about their medications, vitamins, and/or supplements for the first time or as follow-up to their previously submitted queries. There is no limit or payment to access the DIS. Upon submission of a medication query, a volunteer pharmacist (consultant) on duty receives and answers the query through a Google Sheet. Afterwards, the consultant informs another volunteer pharmacist (validator) to validate the answer to the query. Once validated, the assigned sender for the day forwards the validated response to the client through their preferred means (e-mail, text message, Messenger). To ensure privacy of patient information sent through the DIS, access to the Google Sheet is limited to the volunteer pharmacists who completed an online orientation on the standard operating procedures of the DIS and to students who are enrolled in an undergraduate course with the DIS as a mode of instruction.

This study aimed to assess the clients' perceptions of the UPCP Telepharmacy Service on their knowledge, decision-making, and medication safety. Specifically, it aimed to: (1) identify the drug information needs of clients; (2) describe the level of satisfaction of clients of the service received; (3) determine perceived effects of the telepharmacy service on knowledge, decision-making, and medication safety; and (4) explain relationships of demographic characteristics with their perceptions.

MATERIALS AND METHODS

Research Design

This study used a quantitative, cross-sectional design, which was conducted remotely from May to August 2022 through voice call interviews.

Sampling Plan

The participants of the study were randomized from the list of clients of the Telepharmacy Service database of the College of Pharmacy, University of the Philippines Manila from October 2020 to July 2022. The inclusion criteria for this study were: (1) must be at least 18 years old; (2) with no cognitive impairment; (3) must have sent a medication-related query in the UPCP Telepharmacy Service from October 2020 to July 2022, and (4) must be contacted through voice call platforms. The exclusion criteria for this study were: (1) non-response to the invitation to participate in the study, and (2) client did not provide their consent to participate in the study.

The computed sample size with an assumed 25% non-participation was 273 participants. Simple random sampling was employed to randomize the study population. Respondents were contacted through their given contact information to evaluate if they meet the criteria, ask for their participation in the study, and set an appointment to answer the survey questionnaire.

Study participants who did not provide complete responses to the questions asked during the interview were considered withdrawn from the study.

Instrumentation

A structured questionnaire, composed of close-ended questions and statements about demographic characteristics, drug information needs, satisfaction, perceptions on drug information advice, perceived effect on knowledge, drug decision-making, and perceived effect on medication safety was developed. This was initially written in English then translated into Filipino by the Sentro ng Wikang Filipino to accommodate the local language of participants and improve their understanding of the study. It was formatted as a Google Form which was used by trained data collectors to input the data collected from the participants.

Pretesting was conducted by interviewing 30 telepharmacy clients. The result of the pretesting was used to revise the questionnaire. The following results for inter-item reliability for each variable was obtained: satisfaction α=0.8809, drug information advice α=0.8500, knowledge α=0.8871, decision-making α=0.8726, and medication safety α=0.7865. These values indicate that the questionnaire has high inter-item reliability and internal consistency (α>0.7000) and thus, may be implemented for the actual data collection. The data collection was conducted between May and August 2022.

Data Collection

Eight (8) data collectors were trained to gather data. The training session was conducted online, and a written training module was provided that can be accessed anytime during the data collection. Data collectors were present during the data collection process to guide the participants in answering the close-ended questionnaire. They were trained to clarify any questions which may arise when participants need help in understanding any items of the questionnaire.

Previous clients of the telepharmacy service were invited to participate through e-mails, text messages, and Facebook Messenger chat—depending on the contact information found in the database. On the day of the interview, participants were contacted through phone calls by the assigned data collector. The data collectors began by reading the informed consent form to the participants to obtain their verbal consent. Participants who did not agree to recording of the interview or did not give their consent were excluded from the study. The data collectors then proceeded by verbally asking each question in the questionnaire and reflecting these responses on the Google Form. The participants were given opportunities to clarify questions and review their responses throughout the interview.

The audio recording of each interview was uploaded in a secured platform which was used to validate the accuracy of the answers of the participants in the data collection tool. The validation was performed by a member of the research team by listening to the audio recordings and cross-checking and editing of the encoded responses as needed.

Data Processing and Analysis

All completed questionnaires were encoded in Microsoft Excel while statistical data for quantitative analysis was generated from Stata 17.0 MP-Parallel Edition (Stata Corp LLC; Serial Number: 501709316212). All data were stored in a password encrypted hard drive to ensure data security.

The study employed frequency and descriptive statistics to describe the demographic characteristics, drug information needs, satisfaction, and perceptions. Data from the different variables in the study were weighted and mean scores were used. MANOVA and Multiple linear regression were used in describing the relationships of the demographic characteristics with client satisfaction and perceptions.

Prior to implementation of the study, ethical approval from the UP Manila Research Ethics Board (UPMREB) was sought (UPMREB Code: UPMREB 2022-0154-EX).

RESULTS

Sociodemographic Characteristics of Study Participants

A total of 72 participants consented and completed the survey. Majority were from 30 to 59-year-old age category (51.39%), females (72.22%), from Region IV-A (36.11%), college graduates (44.44%), and with average monthly income of below PhP 11,000.00 (47.22%). The summary of sociodemographic characteristics of the study participants are found in Table 1.

Drug Information Needs of Clients and Client Satisfaction

About 82% (f = 59) of drug queries asked about a single information on drug medication (Table 2) while the remaining 18% (f = 13) are queries involving multiple categories in one query. Adults aged 18 to 30 (f = 8) and females (f = 8) had the most multiple queries; adults aged 31 to 59 years had more queries about herbal medicines/ supplements (f = 6) and over-the-counter medications (f = 6); NCR residents (f = 6) had more queries on ADRs; and clients with income below PhP 11,000.00 (f = 6) had more questions on administration and dosage.

Table 1. Sociodemographic characteristics of the study participants, n=72

Characteristic	Total, n (%)
Age Group	
18 to 30 y/o	30 (41.67)
31 to 59 y/o	37 (51.39)
≥60 y/o	5 (6.94)
Sex	
Female	52 (72.22)
Male	20 (20.78)
Region of Residency*	
Region I	2 (2.78)
Region II	3 (4.71)
Region III	8 (11.11)
Region IVA	26 (36.11)
Region V	4 (5.56)
Region VI	1 (1.39)
Region VII	1 (1.39)
Region X	1 (1.39)
Region XIII	2 (2.78)
NCR	23 (31.94)
Educational Attainment	
No formal education	1 (1.39)
Elementary graduate	1 (1.39)
High school graduate	19 (26.39)
Some college education	9 (12.50)
College graduate	32 (44.44)
Vocational	4 (5.56)
Master's education graduate	6 (8.33)
Average Monthly Income*	
≤PhP 11,000	34 (47.22)
PhP 11,001-15,000	5 (6.94)
PhP 15,001-20,000	7 (9.72)
PhP 20,001-25,000	8 (11.11)
PhP 25,001-44,000	4 (5.56)
PhP 44,001-77,000	2 (2.78)
≥PhP 77,001	2 (2.78)

**One missing data, **Ten missing data*

Table 2. Summary of drug information queries

Type of information	Frequency (%)
Multiple categories	13 (18.06)
Non-prescription medicines (herbal medicines and supplements)	10 (13.89)
Over-the-counter medications	9 (12.50)
Adverse drug reactions	8 (11.11)
Drug indication	8 (11.11)
Administration/ dosage of medications	7 (9.72)
Drug interactions	5 (6.94)
Drug substitution	5 (6.94)
Drugs in pregnancy and lactation	2 (2.78)
Failure of symptom resolution	2 (2.78)
Others	3 (4.17)
Total	72 (100)

Table 3. Summary of descriptive statistics on client satisfaction

Item	Mean	SD
I trust the information that I received about medicines.	4.625	0.061
The pharmacist was able to provide my needed information about medicines.	4.555	0.065
I have confidence in the correctness of the advice from the drug information service.	4.653	0.060
I was reassured about my medication taking.	4.417	0.086
I am content with the quality of service that I received.	4.639	0.060
Having this kind of service is beneficial for the community.	4.764	0.050
I will use this drug information service again when the need arises.	4.722	0.053
Overall Mean	4.625	0.047

Overall**,** respondents reported high satisfaction of the drug information service ($\bar{X}$ = 4.625 ± 0.047). Clients especially agreed that this service is beneficial for the community (Table 3).

Perceptions on the drug information advice and perceived effects on knowledge, decision-making, and medication safety

Clients reported very positive perceptions on the drug information advice received ($\bar{X}$ = 4.510 ± 0.055). They agreed that the pharmacist helped them understand their medications (Table 4). These are consistent with their responses in terms of the perceived effect of the DIS on their knowledge of medications where a mean rating of $\bar{X}$ = 4.213 ± 0.050 was recorded. Overall, clients agreed that the drug information advice influenced their decision-making about their medications ($\bar{X}$ = 4.514 ± 0.054). Clients, likewise, perceived that the drug information advice obtained increased their understanding of medication safety ($\bar{X}$ = 4.522 ± 0.053) (Table 4).

Adults aged 31 to 59 years ($\bar{X}$ = 4.554 ± 0.453), males ($\bar{X}$ = 4.562 ± 0.428), those living in Region II ($\bar{X}$ = 4.609 ± 0.432), high school graduates ($\bar{X}$ = 4.750 ± 0.00), and those with income PhP 44,001.00 to PhP 70,000.00 ($\bar{X}$ = 4.875 ± 0.144) had the highest positive perceptions on drug information advice. However, multiple regression analysis revealed that none of these demographic characteristics were significantly associated with perceptions on drug information advice.

In terms of perceived effect on knowledge, adults aged 18 to 30 years old ($\bar{X}$ = 4.228 ± 0.383), males ($\bar{X}$ = 4.25 ± 0.322), living in Region X ($\bar{X}$ = 4.667 ± 0.00), elementary graduate ($\bar{X}$ = 5.000 ± 0.00), and with income, ≥PhP 77,001.00, ($\bar{X}$ = 4.583 ± 0.589) were found to have higher mean ratings which indicated better or more positive perceptions. Multiple regression analysis, likewise, revealed no significant associations of these variables with perceived effect on knowledge.

For perceived effect on decision making, adults aged 18 to 30 years old ($\bar{X}$ = 4.533 ± 0.437), males ($\bar{X}$ = 4.550 ± 0.458), from the National Capital Region ($\bar{X}$ = 4.900 ± 0.141), college graduates ($\bar{X}$ = 4.711 ± 0.401), and with income of PhP 25,001.00 to PhP 44,000.00 ($\bar{X}$ = 4.850 ± 0.191) had higher mean ratings which also indicated more positive perceptions although none of these were significantly associated. However, perceptions on drug information advice appeared to be positively associated (r = 0.5033; p = 000) with perceived effect on decision making.

For perceived effect on medication safety, higher mean ratings were observed in adults aged 31- to 59-years ($\bar{X}$ = 4.551 ± 0.433), female ($\bar{X}$ = 4.542 ± 0.439), from the National Capital Region (4.800 ± 0.00), with elementary education ($\bar{X}$ = 5.000 ± 0.00), and with income PhP 44,001.00 to PhP 77,000.00 ($\bar{X}$ = 4.700 ± 0.141). Multiple regression analysis however did not indicate any significant associations between these variables. Perceptions on drug information advice was found to be significantly associated with perceived effect on medication safety (r = 0.4320; p = 0.004).

DISCUSSION

Only 26% of the computed sample size of 273 was covered in the study. Participants were contacted based on their provided contact information in the UPCP Telepharmacy Service database either through e-mail, text message, or Facebook Messenger chat, however, no response from the invited participants was obtained after the initial invitation to participate and follow-ups.

Frequent users of the service were those in the age range of 18 to 59. These are the age groups who are part of the working population and with higher educational background. These results could imply that they have more access to the internet, better digital literacy, and knowledge on online platforms to access health services and information. These results align with a similar study where the highest number of queries received by a newly established drug information center telehealth service were from young adults aged 25 to 34 years as well as the results of a systematic review on online

Table 4. Perceptions of clients on drug information service

Item	Mean	SD
Perceptions on Drug Information Advice		
The pharmacist helped me to understand the intended use of my medications.	4.597	0.494
The pharmacist helped me to understand the intended results of my medications.	4.569	0.577
The pharmacist helped me to understand how to take my medications safely and correctly.	4.653	0.479
I feel that my overall health and well-being improved because of using the drug information service.	4.222	0.716
Overall Mean and Standard Deviation	4.510	0.055
Perceived Effect on Knowledge		
A person with many conditions needs to take more medicines to get better.	3.028	1.125
I know the effects and side effects of drugs that I buy or are prescribed to me.	4.292	0.740
I know both the dose and proper administration of my medications.	4.444	0.625
When reading the information provided by the drug information service, I fully understand the contents.	4.500	0.531
My knowledge about my drug therapy increased after using the drug information service.	4.611	0.545
I learned the importance of lifestyle changes in managing my condition after receiving drug information advice.	4.403	0.597
Overall Mean and Standard Deviation	4.213	0.050
Decision-making		
I used the advice to guide me to properly use my medication.	4.583	0.524
I used the advice to check the safety or risks of the medication therapy.	4.555	0.554
I used the advice as part of my decision-making process.	4.542	0.529
I used the advice to confirm the course of action (change or retention) of my therapy.	4.542	0.555
The advice enabled me to participate in my disease management.	4.347	0.653
Overall Mean and Standard Deviation	4.514	0.054
Perceived Effect on Medication Safety		
The advice increased my knowledge on the safe use of my medications.	4.708	0.458
By learning more about my medicines, I became more careful in taking my medicines.	4.667	0.531
I understand that any unusual symptoms may be due to the drugs that I am taking.	4.069	0.845
I understand that not all medicines can be taken at the same time.	4.597	0.620
When I have drug-related concerns, I know when I should consult a healthcare professional.	4.569	0.668
Overall Mean and Standard Deviation	4.522	0.053

health-seeking behavior.[5,6] Unlike the younger population who are more accepting of telehealth service, older adults have difficulty understanding, accepting digitized health services which limits their ability to utilize drug information services delivered through telepharmacy.[5,7] Likewise, literature states that health information consumers with higher literacy and educational attainment, have better online health-seeking behavior in terms of frequency and ease of access.[6,8,9] Females are also shown to be more inclined to seek online health information consistent with existing studies on gender influence on healthcare-seeking behavior.[6,8]

There were more queries from those earning below PhP 11,000.00 which were primarily about appropriate administration/dosage instructions for their medicines. This could imply they want to maximize the benefits of the purchased medicines and avoid further expense on physician consultation and additional medicines. While previous studies suggest that patients with high income more commonly access online health information and services due to the availability of devices and access to the Internet,[6,10] in the Philippines there is a wide range of prices for smartphones and variety of data plans to access the Internet making it affordable to the public. Consequently, majority of the clients belonging to this income class were young adults in the 18-to 30-year-old age group and females. It was also observed to have more queries from highly urbanized regions, Region IV-A, and NCR which could indicate better access to technology and more stable Internet connectivity compared to the other regions.[11]

About 18% of the queries asked for multiple information in one submission which maximizes the service considering that the nature of communication is one-way. The current set-up breaks the time and personal barriers which usually happen during face-to-face or real-time consultations with health care providers. It then allows clients to think of more questions regarding their health and medicines without having to worry about verbally communicating these concerns. Other DIS using a telehealth approach had similar observations.[5] More than 25% of the queries were about over-the-counter medicines and herbal products, both are non-prescription products and often used for self-medication. These products are likewise heavily advertised and easily accessible to the Filipinos. Self-diagnosis and self-medication are prevalent practices among Filipinos even before the COVID-19 pandemic.[12] The telepharmacy service may have been an opportunity for patients who self-medicate to confirm the appropriate use of these products. Furthermore, restrictions in accessing health care services

and focusing on improving one's health to reduce the risk of being infected by COVID-19 may have enabled patients to take non-prescription medicines based on what they hear and read from advertisements, social media, and their families and friends.

Clients interviewed were very satisfied with the drug information service provided as demonstrated by the high ratings which is consistent with other studies.[13] Perceived patient satisfaction with pharmacy services is found to be low to satisfactory when there is no pharmacist available to deliver these services.[14,15] Clients were also very satisfied with the process of receiving drug information. This may be due to the convenience that DIS offers where they can simply receive information needed at the comfort of their homes which also saved their time and probability of getting infected during the pandemic.[16] Clients, also had very positive perceptions on the drug information advice that they received. They agreed that the drug information advice improved their understanding of medications which were consistent with their perceptions on the effect of the drug information advice on their knowledge. Previous literature on a similar topic suggests that positive perceptions of DIS significantly improve knowledge of its clients on their medications. In these studies, drug information advice is part of a long-term intervention or program which is commonly pharmacist-led.[17-20] These studies also implemented several modes of delivering drug information advice such as phone calls, daily reminder texts, written information, one-on-one counselling, and small group classes in regular intervals and as needed by the patients. In contrast to our study where we only measured perceived effects on knowledge – so while our clients claimed that the DIS improved their knowledge, we could not accurately ascertain whether it actually improved their knowledge. In addition, the clients only availed of the service for a limited time where the written drug information is delivered through their preferred platform.

The study's findings also suggest that the clients' decision-making regarding their medications and their understanding of medication safety were improved as a result of the drug information advice received from the telepharmacy service. Receiving drug information advice from a pharmacist allows a patient to feel more supported and empowered for them to make decisions and act on their health. Most patients usually seek advice from health care providers and alternative sources of information such as the Internet for them to make an informed decision.[21] Health information patients obtained on their own influences their health treatment decision making and how they maintain their overall health.[6] It also aligns with the agreement of interviewed healthcare providers in a study that drug information advice had an impact on their actions which may have contributed to patient care and outcomes such as decreased risk of an adverse drug reaction, possibly lower risk associated with drug therapy, having patients feel more reassured, and improved participation of patients in the choice of their medicine and healthcare.[22] Allowing patients to have better grasp on medication information for a more informed decision making was found to positively affect medication safety as drug information allows patients to understand the concept of drug interactions and adverse drug reactions which better equip them on the effects of prescribed and over-the-counter medicines, including herbal supplements. Empowering patients on their decision making to improve medication safety can overcome low health literacy and other social health markers of vulnerability to improve the quality of patient care.[23] Drug information needs may vary among patients and clients but receiving the information in an accessible, timely manner, and having a good relationship with health providers are the most common predictors for patients to facilitate decision-making.[24]

Strengths and Limitations of the Study

This is the first study in the Philippines that explored the potential of a drug information telepharmacy service and investigated its patient-perceived effects to medication safety. This study also provides evidence that patients are satisfied with a pharmacist-led intervention in the local setting.

The study, however, has several limitations. The research did not reach the required number of participants (26%) which limits generalizability of results. Majority of the queries in the drug information service evaluated was categorized as multiple categories based on the assessment during the receipt of the query by the pharmacists assigned. There was no sub-analysis conducted for these queries. The perceived effect of the DIS on the participants' knowledge was not established since only the perceived improvement in knowledge was measured. Recall bias and social desirability bias may have taken place during data collection as time between receiving the query and the start of the data collection process has been at most one year, while the presence of a data collector may have affected how the respondents answered the questionnaire. Due to the retrospective nature of the study, pre- and post-intervention results of the knowledge and decision-making variables were not assessed. Lastly, other factors that may affect knowledge, decision-making, and medication safety such as occupation, cultural perspectives on telepharmacy, health literacy, digital literacy, and availability of resources were not included in the study.

CONCLUSION AND PERSPECTIVES

With the deluge of information about medicines and health on the internet accessible to the public, the need for a reliable and equally accessible source of information cannot be underscored. The pharmacist-led drug information service, such as the UPCP Telepharmacy Service, is a convenient and promising program that has the potential to be replicated in low-resource settings as a source of accurate medical information tailored fit according to the needs of the client. It can help improve knowledge of patients about appropriate

use of medicines, drug interactions, and adverse drug reactions that will enable them to make informed decisions regarding their medications and identify the need to consult with healthcare providers.

Findings from this study suggest the service is highly appreciated and would benefit the community it serves especially in ensuring medication safety. Continuous monitoring and evaluation of the existing telepharmacy service is recommended to further enhance and optimize existing processes. A prospective study with multiple time points may also be conducted to directly measure the effect of interventions with medication safety and/or medication adherence-related outcomes. A feasibility study on remuneration for this service may also be conducted to address possible issues on sustainability.

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Statement of Authorship

All authors certified fulfillment of ICMJE authorship criteria.

Author Disclosure

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