

The Effectiveness of Telepharmacy on Hypertensive Patients

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Abstract:- Telepharmacy is a pharmaceutical care provision through a remote interaction between patients and pharmacists that provides patient counseling on medication management and adherence, especially on chronic diseases such as hypertension. The study aims to evaluate the effectiveness of telepharmacy intervention on hypertensive patients during the COVID-19 pandemic. The research employed a quantitative, quasi-experimental design utilizing a purposive sampling technique to assess the effectiveness of telepharmacy intervention on their blood pressure and medication adherence. Thirty (30) participants were examined and subjected to the study using Wilcoxon signed-rank t-test and Student's t-test to compare and analyze the parameters before and after the interventions. The results showed that telepharmacy intervention manifested a significant difference in the level of effectiveness of the patient's systolic profile ($p=0.009$), diastolic profile ($p=0.766$), and medication adherence ($p<0.001$) in the intervention conducted. Moreover, there was a significant difference between the patients subjected to the intervention ($p=0.009$) and those who did not receive any intervention ($p=0.798$). Correlations between the parameters showed a moderately high negative relationship (-0.678) between the telepharmacy intervention and the blood pressure and medication adherence ($p<0.01$) which was highly significant. This means that as medication adherence increases, blood pressure decreases. Therefore, the effect size of the telepharmacy intervention was effective in decreasing its systolic, controlled diastolic, and medication adherence. Nevertheless, telepharmacy intervention is not yet fully maximized in the Philippines which can be a potential use in delivering pharmaceutical care. Current findings clearly illustrate the desirability and efficacy of telepharmacy intervention that can be utilized in the accessibility of medications to hypertensive patients.

Keywords:- telepharmacy; hypertension; adherence; pharmacists; Philippines.

I. INTRODUCTION

The main cause of coronary and early death is hypertension around the world. The world average blood pressure (BP) was however stable or significantly reduced over the last four decades, due to the widespread use of antihypertensive drugs. In the Philippines, research has shown significant growth in the death rate from 11 percent in 1990 to 21 percent in 2017, although hypertension-related diseases have increased from 4 to 11 percent, and the prevalence of hypertension has increased significantly in the last three decades. The Hypertension Study Board 2007 Philippine Heart Association (PRESYON 2-TOD) observed that only 13 percent of hypertension in the Philippines were used for BP, and up to 75 percent of treated patients had monotherapy.

Pharmacists play a critical role in hypertension treatment. Their intervention has been shown to increase BP regulation and commitment to antihypertensive therapy, particularly counseling, drug tracking and examination, blood pressure (BP) assessment, and cardiovascular risk factors monitoring. The addition of telehealth (so-called telepharmacy) to such a model would improve the pharmacist's involvement and provide additional benefits for hypertensive patients and their overseeing physicians in pharmacy operations and medical care at a distance.

Telepharmacy is intended to provide remote pharmacy operations and patient services, as well as to improve healthcare access, patient safety, and stoic performance. To establish and deliver telepharmacy programs, a variety of tools, treatment models, and procedures are used, with the goal of reaching out to diverse communities suffering from a variety of pathological disorders, including cardiovascular disease.

With this, the researchers would like to evaluate the effectiveness of telepharmacy intervention on hypertensive patients, whether the said intervention is effective or not, by assessing hypertensive patients' medication adherence and blood pressure. The study may also be utilized by pharmacy students, pharmacists, and other health professionals for future research about adopting telepharmacy in the Philippines.

II. METHODS

A. Study Design

This study will utilize a quantitative, quasi-experimental research design involving hypertensive patients from Poblacion 6, Buenavista, Agusan del Norte. A quasi-experimental research design is used to estimate a causal impact of an intervention on a target population without random assignment, which attempts to establish a cause and effect relationship. The researchers will be using purposive sampling techniques in choosing the participants by identifying them through inclusion and exclusion criteria. The purpose of this research is to evaluate the effectiveness of telepharmacy as an intervention among hypertensive patients by assessing the improvements in medication adherence and blood pressure.

B. Subject Participants

Hypertensive patients age at least 30 years old and above, taking three or more medications including maintenance, supplements, over-the-counter drugs (polypharmacy), and a bonafide citizen of the Poblacion 6, Buenavista, Agusan del Norte. The participants must also have a cellular phone with them.

C. Instrument

A questionnaire adopted from the Malaysia Medication Adherence Assessment Tool (MyMAAT), consisting of 12 questions, was utilized to survey the participants of the study. Individual items were scored using the following criteria: five marks for ‘strongly disagree,’ four marks for ‘disagree,’ three marks for ‘neutral,’ two marks for ‘agree,’ and one mark for ‘strongly agree.’ The MyMAAT score was the total of the marks for the individual items ranging between 12 and 60. The following cut-off point is suggested to classify patients’ medication adherence status: Score 12 – 53: non-adherence and score 54 – 60: adherence.

D. Data Collection Procedure

Before the collection of the data, the researchers asked for approval to conduct the study through their mentors and the research ethics committee of the institution. After the approval, participants were screened based on the inclusion criteria and those who qualified were given informed consent. Participation was voluntary. The Malaysian Medication Adherence Scale (MyMAAT) survey form was given prior to the monitoring. The participant's blood pressure was also taken to assess what needed to be improved. Then, the participants were introduced to the clinical pharmacist who monitored the patients for two months. A phone call was administered every week between the clinical pharmacist and the patient to monitor the improvement in regard to their blood pressure and medication adherence. After two months of monitoring, the patients were given the MyMAAT survey form to measure the effectiveness of the intervention for hypertensive patients in terms of their adherence. Their blood pressure was also taken to know if there are changes and improvements. All information said and written by the patients’ were not shared outside the research team and was kept confidential.

E. Data Analysis

Before A total of 30 hypertensive patients will be participating in the study, 15 of them will not undergo telepharmacy intervention and the other 15 participants will receive the intervention. The researchers will use the following methods in analyzing and interpreting the data: **Mean and Standard deviation** is used to analyze the level of the parameters of hypertensive patients. **Paired T-test** (T-test for dependent samples) is used to analyze if these parameters differ significantly before and after the intervention and if there is a significant difference in the parameters of hypertensive patients for those with and without the intervention. **Spearman’s Correlation** is used to determine the relationship between medication adherence and the blood pressure of the patients.

III. RESULTS AND DISCUSSION

A. Profile of Respondents

A total of 30 participants was monitored throughout the duration of the study. Table 1 below shows that after 2 months of intervention, the patient's blood pressure improved. In particular, nine of the participants had a decrease in their blood pressure, four of them remained the same and only two of them had a small increase in blood pressure.

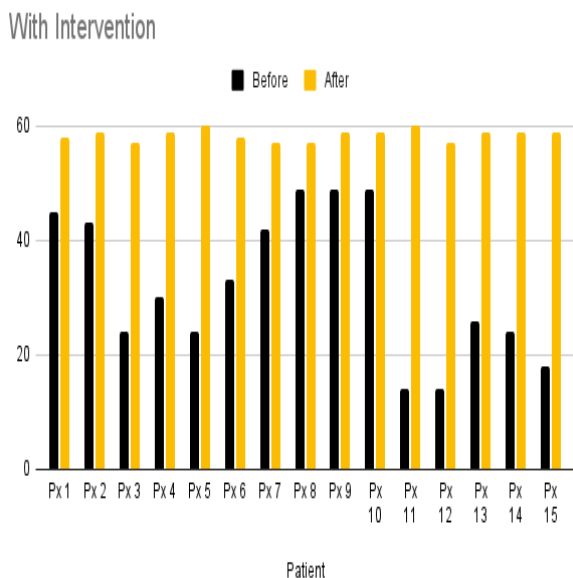
With Intervention	Before	After
Participant 1	125/80	120/80
Participant 2	130/80	130/90
Participant 3	130/80	120/90
Participant 4	160/90	130/90
Participant 5	150/80	130/80
Participant 6	180/90	130/80
Participant 7	130/90	120/80
Participant 8	130/80	130/80
Participant 9	130/80	130/80
Participant 10	130/80	130/80
Participant 11	130/80	125/80
Participant 12	130/80	120/80
Participant 13	120/80	120/80
Participant 14	120/80	125/80
Participant 15	140/90	130/80

Table 1: Blood Pressure of Participants With Intervention Before and After the Intervention

Without Intervention	Before	After
Participant 1	160/80	150/80
Participant 2	160/90	160/100
Participant 3	130/80	150/80
Participant 4	130/90	150/90
Participant 5	130/80	150/80
Participant 6	160/90	160/80
Participant 7	140/80	170/90
Participant 8	160/90	160/90
Participant 9	170/90	170/90
Participant 10	150/90	150/80
Participant 11	190/80	170/80
Participant 12	150/90	170/80
Participant 13	160/80	150/90
Participant 14	130/80	160/80
Participant 15	120/80	160/90

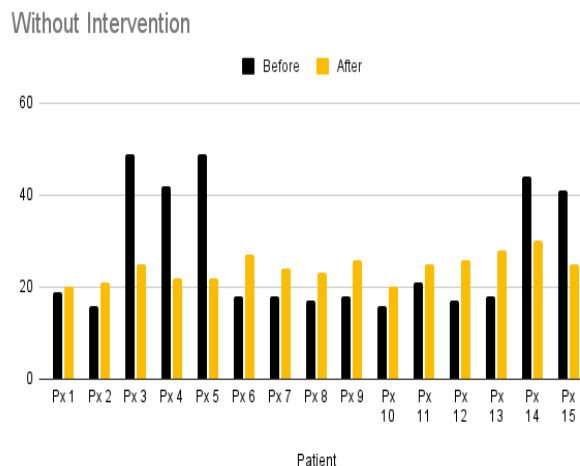
Table 2: Blood Pressure of Participants Without Intervention Before and After the Intervention

Table 2 signifies that there is a minimal to no improvement in the patient’s blood pressure after 2 months of not receiving any telepharmacy intervention. In specific, five of the participants had a small decrease in their blood pressure, two of them remained the same, and eight of them had an increase in their blood pressure.



Graph 1: MyMAAT Results of Hypertensive Patients with Intervention

Graph 1 is a representation of the MyMAAT results of the patients subjected to the telepharmacy intervention after two(2) months of receiving an intervention. The fifteen(15) respondents had a significant increase in their MyMAAT score.



Graph 2: MyMAAT Results of Hypertensive Patients without Intervention

The graph above is a representation of the MyMAAT results of patients who did not receive the intervention after two months. It is apparent that there is minimal to no improvement at all in terms of their MyMAAT scores.

B. Blood Pressure and Medication Profile

Table 2 shows the profile of the respondents with and without intervention in terms of their blood pressure and medication adherence. For blood pressure, it is interpreted in terms of the systolic and diastolic profile and for medication adherence, it is interpreted based on the Malaysia Medication Adherence Assessment Tool(MyMAAT). For the systolic profile of the group with intervention, before the telepharmacy, the respondents had a mean of 135.667 mm Hg (SD = 16.132). After the intervention, the patients in the intervention group had a decreased mean blood pressure of 119.333 mm Hg (SD = 27.830). Group without intervention, on the other hand, prior to the intervention, the group had a mean of 149.333 mm Hg (SD = 19.074) After the intervention, the group without intervention had persistent, elevated blood pressure, with a mean of 158.667 and a standard deviation of 8.338.

In the diastolic profile, both groups had a normal interpretation of their diastolic profile before and after the intervention. For the patients with intervention, before the telepharmacy, 82.667 mmHg was the mean with a standard deviation of 4.577. After the intervention, a mean of 82.000 mmHg and a standard deviation of 4.140 was obtained. Furthermore, the group without intervention had a mean score of 85.333 and a standard deviation of 4.140. After 2 months of no intervention, 85.333 mean and 6.339 standard deviations were obtained respectively, indicating a normal diastolic profile.

Whereas for the medication adherence of the respondents, both groups had a non-adherent score based on the MyMAAT Questionnaire. A mean score of 32.267 and a standard deviation of 12.909 was obtained for the group with intervention. Meanwhile, the group without intervention had a mean of 26.867 and a standard deviation of 13.479. After the intervention, the group who received

the intervention had a mean score of 58.467 and a standard deviation of 1.060, which can be interpreted as adherent based on the MyMAAT scoring (Score \geq 54). In contrast, the group without intervention remained non-adherent, with a mean of 24.267 and a standard deviation of 2.939.

There is a great improvement in the patients with intervention as compared to the group without intervention according to their blood pressure and medication adherence profile. In line with the study of Fensterheim et al., aimed at increasing treatment adherence by means of telepharmacy, of a patient with a pharmacist at the beginning of the intervention. In comparison to a control group, there were considerably greater chances of adhering to the medicine in individuals who had the telepharmacy consultation.

Parameter	Group	Before Intervention			After Intervention		
		Mean	SD	Interpretation	Mean	SD	Interpretation
Systolic (mm Hg)	With Intervention	135.667	16.132	High BP	119.333	27.830	Controlled
	Without Intervention	149.333	19.074	High BP	158.667	8.338	High BP
Diastolic (mm Hg)	With Intervention	82.667	4.577	Controlled	82.000	4.140	Controlled
	Without Intervention	84.667	5.164	Controlled	85.333	6.399	Controlled
Medication Adherence (MyMAAT)	With Intervention	32.267	12.909	Non-adherent	58.467	1.060	Adherent
	Without Intervention	26.867	13.479	Non-adherent	24.267	2.939	Non-adherent

Table 3: Blood Pressure and Medication Adherence Profile of the Respondents

C. Effectiveness of Telepharmacy Intervention

The effectiveness of telepharmacy intervention is determined using the effect size which establishes the relationship between the telepharmacy intervention and the parameters. The medication adherence and blood pressure of the patients were analyzed to measure their experimental effect on the study.

Parameters	p	Effect Size	Interpretation
Systolic	0.009	-0.945	Large Negative
Diastolic	0.766	-0.200	Small Negative
MyMAAT	<.001	1.989	Large Positive

Table 4: Effect Size of the Telepharmacy Intervention

The medication adherence and blood pressure of the patients were analyzed to measure their experimental effect on the study. Table 3.5 shows the effect size of the tested parameters in the intervention. The systolic p-value (0.009) denotes that the intervention significantly works, and the systolic effect size (-0.945) indicates a large negative effect size. For this reason, the intervention that has been done revealed a high level of effectiveness in decreasing the systolic profile of the respondents.

Moreso, the diastolic p-value (0.766) tells us that the intervention is not significant yet within the acceptable range. Obtaining an effect size of -0.200 means acquiring a small negative effect size. Hence, the intervention was neither effective to decrease the diastolic of the respondents due to its diastolic range (80-90 mm Hg). Nonetheless, the diastolic is still within the acceptable range.

As for the medication adherence, the MyMAAT p-value (<.001) that was accumulated means the intervention significantly works, providing its effect size of 1.989. The medication adherence denotes a large positive effect size which comes to an end that the intervention that has been put together has a high level of effectiveness in improving patient's adherence to medication.

Based upon the statistical outcome, the level of effectiveness of the telepharmacy intervention formulated on the hypertensive patients with their medication adherence and blood pressure after the intervention, positively laid out that the intervention is highly effective in decreasing the systolic, maintaining its diastolic within the acceptable range and its medication adherence that provides as a basis of a positive effect which shows the effectiveness of the intervention made.

D. Difference Between the Before and After Telepharmacy Intervention

As shown in Table 4, the results revealed that the group with intervention had a (p-0.009) in the systolic parameter which can be interpreted that there is a significant difference between the before and after telepharmacy of the participants' systolic blood pressures. The diastolic parameter had a (p-0.766) indicating that there is no significant difference in the before and after telepharmacy of the participants' diastolic blood pressures. Lastly, the medication adherence had a (p-<.001) which denotes that there is also a significant difference between the before and the after telepharmacy results of the participant's adherence to their medication.

In contrast, the group without intervention had a (p-0.058) in the systolic parameter which shows that there is no significant difference in the before and after the intervention of their systolic blood pressures. The diastolic parameter had a (p-0.777) meaning that there is no significant difference in the before and after telepharmacy of the participants' diastolic blood pressures. In terms of their medication adherence, it had a (p-0.798) demonstrating that the difference between the participant before and after intervention medication adherence findings is not significant.

By this data, the researchers infer that the respondents who have received an intervention have a significant difference from the respondents who did not receive an intervention when it comes to the parameters that have been

used in monitoring their blood pressure and medication adherence.

Group	Parameter	p-value	Interpretation
With Intervention	Systolic	0.009	Significant
	Diastolic	0.766	Not significant
	Medication Adherence	<.001	Significant

Table 5: Significant Difference between Before and After Telepharmacy Intervention Parameters of Patients With Intervention

E. Correlation between the medication adherence and blood pressure of the patients

The blood pressure and medication adherence were correlated using the Spearman correlation. The Spearman correlation determines the relationship between medication adherence and the blood pressure of the patients.

Correlation Table		Spearman rho	p	Interpretation
MyMA AT	Systolic	-0.678	<.001	Significant
MyMA AT	Diastolic	-0.291	0.119	Not Significant

Table 6: Correlation between the Medication Adherence and Blood Pressure

Table 5 shows that there is a correlation between the telepharmacy intervention and the respondent’s medication adherence and blood pressure. The statistical analysis revealed that there is a moderately high negative relationship between the telepharmacy intervention and the following parameters, which means as the medication adherence increases, the blood pressure decreases. The p-value obtained was <.001 which means that it is highly significant. Similarly, a study conducted by Uludag, et al. investigated the relationship between patient medication adherence and blood pressure (BP) values. It was revealed in the result of the study that there is a negative correlation between systolic blood pressure and the medication adherence of the patients. This means that as one variable increases the other decreases. Additionally, Poulter, et al. found that poor adherence to antihypertensive medication is a key factor in poor blood pressure management in another study evaluation.

IV. CONCLUSION

Telepharmacy is designed to provide remote pharmacy operations and patient services, increase healthcare access, enhance patient safety, and improve stoic performance.

The final findings determined the level of effectiveness of telepharmacy intervention on hypertensive patients using the effect size. It was positively laid out that the intervention is highly effective in decreasing the systolic, maintaining its diastolic within the acceptable range, and its medication

adherence provides a basis for a positive effect which shows the effectiveness of the intervention made. Moreso, there is a significant difference between the before and after the intervention of patients with and without the telepharmacy intervention in terms of medication adherence and blood pressure. Similarly, based on the MyMAAT score, the telepharmacy intervention has a significant impact on the medication adherence of the participants that received the intervention before and after the telepharmacy intervention. On the other hand, the final results of the group that did not receive any intervention had a minimal to no significant difference. Also, it can be determined that the group who received intervention shows a lot of improvement compared to the group who did not receive any intervention in terms of medication adherence and blood pressure. Ultimately, it was determined that there is a negative correlation between medication adherence and the blood pressure of the participants. Overall, the study shows a high level of effectiveness of telepharmacy intervention in hypertensive patients. It can be ascertained that the intervention

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