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Predictors of Medication Adherence among Hypertensive Patients in Tuao, Cagayan

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Abstract*— Hypertension continues to be the prevailing cause of non-communicable illness fatalities globally and it is an uncontrolled worldwide epidemic. In Cagayan, the prevalence of hypertension is undoubtedly so high that hypertension even ranked 3rd among the leading causes of mortality and morbidity. Furthermore, Tuao, Cagayan has ranked 1st among the municipalities in Cagayan in terms of the prevalence of hypertension. Therefore, this research assessed the level of medication adherence of hypertensive patients as well as identified the various predictors that affect the medication adherence of hypertensive patients in Tuao, Cagayan. This study employed the descriptive and correlational research design and adapted a questionnaire that was floated among the hypertensive patients in Tuao, Cagayan who voluntarily participated. The respondents of the study were those patients with hypertension ages 18 and above from the 32 barangays in Tuao, Cagayan. The profile of the respondents was summarized through frequency and percentage. The level of medication adherence was assessed through the 8-item Morisky Medication Adherence Scale (MMAS). In addition, for part two of the questionnaire, the predictors were summarized through mean score. To analyze the predictors of medication adherence of hypertensive patients, simple linear regression was used. According to the findings of the study, the majority of the respondents had poor adherence to their medication. Sociodemographic factors (age, educational attainment, employment status), Healthcare System Related Factor (patient-provider relationship), and Health Condition Factor (blood pressure control) have shown positive relationship towards the medication adherence of hypertensive patients. Studying about these significant predictors of antihypertensive medication adherence will help the health sectors especially the pharmacists to generate an appropriate intervention programs that are effective in increasing the medication adherence of hypertensive patients and, in turn, to address the incidence of hypertension within or outside the sampled locality.

Keywords*— predictors, medication adherence, hypertensive patients, hypertension

I. INTRODUCTION

Hypertension continues to be the prevailing cause of non-communicable illness fatalities globally and it is an uncontrolled worldwide epidemic (Burnier & Egan, 2019). Increase in blood pressure or hypertension, is a condition in which the blood pressure is higher than usual. It is also denoted as a persistent rise of systolic blood pressure of 140 mmHg or higher and/or a diastolic blood pressure of 90 mmHg or higher than normal (Paraidathathu et al., 2012). Due to the risks associated with hypertension such as heart disease, heart attack, and stroke, it is expected that nearly one billion individuals worldwide will be affected (Paraidathathu et al., 2012). The Philippines even ranked number 25 in the world in terms of hypertension with a prevalence of 20% and it is even expected to rise year after year as stated in the data gathered by WHO in 2018. In the same year, the Philippine Health Statistics laid data stating that hypertension ranked 2nd among the ten leading causes of morbidity with 637,078 cases and a rate of 602.4 cases per 100,000 populations (Khayyat et al., 2017). While in Cagayan, hypertension ranked 3rd among the leading causes of mortality and morbidity according to Philippine Health Statistics in the year 2018. Furthermore, Tuao, Cagayan has ranked 1st among the municipalities in Cagayan in terms of prevalence of hypertension. It has a total number of 6655 hypertensive patients according to the Cardiovascular Diseases report of the Provincial Health Office in 2020. Due to the growth of population, aging and various risk factors linked with it, the number of incidents of hypertension is steadily increasing (WHO, 2011). Adequate therapy, earlier detection, and better control of blood pressure are crucial to avoid long-term problems, considering the humanitarianism and economic costs of hypertension (Khayyat et al., 2017). Fortunately, high blood pressure can be treated and is preventable.

On the other hand, managing the continuous rise in hypertension remains a significant issue for both patients and health care providers. Physicians' participation in making suitable treatment decisions and managing medicine doses administered are critical to therapy success. Patients' compliance with prescribed antihypertensive medication is a great key element in meeting blood pressure goals. Optimal blood pressure control is significant in lowering morbidity and death rates; various studies have shown that antihypertensive medication can improve clinical outcomes. Optimal compliance to antihypertensive medication should be put into action to further determine and improve the results of management in terms of quality of life and consequences. On the contrary, noncompliance with medication occurs for a

number of causes, which leads to inadequate blood pressure control, resulting in cardiovascular events, mortality, and higher health-care expenses (Bader et al., 2015).

The WHO in 2003 defines adherence as "the amount to which a person's behavior with respect to taking medication, following a diet, and/or implementing lifestyle modifications matches with approved advice from a healthcare practitioner" in terms of long-term illness. Adherence to a patient's medication is crucial to obtaining blood pressure control. Good medication adherence of patients means that they are considerably less likely to develop high blood pressure. However, poor medication adherence is prevalent, particularly in the management of chronic illnesses like hypertension, resulting now in poor health outcomes and high medical costs due to drug-related morbidity (Paraidathathu et al., 2012). Moreover, poor compliance to medication is the predominant cause of uncontrolled blood pressure among patients with high blood pressure with 52–74 percent who fail to adhere to their antihypertensive medication as directed (Bader et al., 2015). In addition, prevalence of non- adherence is higher in third world nations compared to developed countries since there is lack of health resources and also inequalities to access to health care services (Macquart de Terline et al., 2019). Adherence according to WHO is determined by factors related to socio-economic status, healthcare system, health condition, therapy, and patient-related factors. Several studies consider demographic factors as discrete from socioeconomic factors (Cho et al., 2014). Demographic factors related to medication adherence include gender, age, ethnicity, and residential area. In certain research, females had lower adherence rates than their male counterparts (Khatib et al., 2014; Cho et al., 2014), whereas in other studies, females had higher compliance to antihypertensive medication regimens (Kamran et al., 2014; Paraidathathu et al., 2012).

In the community of Tuao, Cagayan, the level of medication adherence as well as the rationales and the extent for compliance to antihypertensive medication are not yet thoroughly investigated so the needed data on the level of medication compliance are not yet sourced out. Thus, medication adherence and the associated predictors are crucial to assess in order to necessitate some steps that can be done to improve patients' medication adherence, minimize long-term negative consequences of non-adherence, and reduce strain on both patients and health-care professionals. Furthermore, it will also help the health workers to account for different unstudied factors affecting the medication adherence of hypertensive patients, thus generating a better strategy. Therefore, this research aimed to assess the level of medication adherence of hypertensive patients as well as to identify the various predictors that affect the medication adherence of hypertensive patients in Tuao, Cagayan.

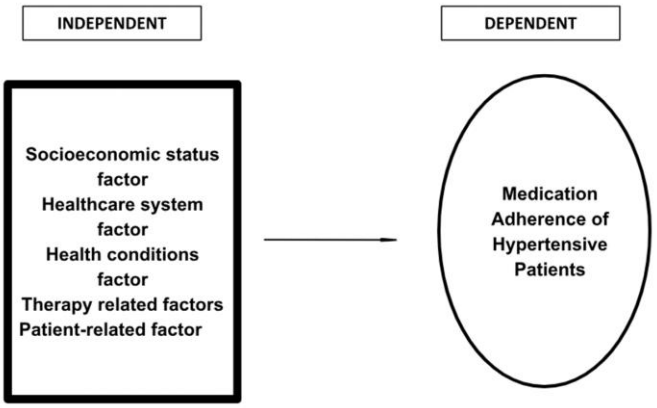

Fig. 1. Research Paradigm

Figure 1 explains the significant association between the medication adherence of hypertensive patients as the dependent variable and the socio-economic status, healthcare system, health conditions, therapy, and patient-related factors as independent variables.

II. METHODS

A. Research Design

This study used descriptive and correlational research design. Descriptive and correlational research designs were appropriate for this research study since it aimed to assess the medication adherence of hypertensive patients as well as determine its associated predictors.

B. Locale and Respondents

The research study was conducted in the 32 barangays of Tuao, Cagayan. Tuao, Cagayan has ranked 1st among the municipalities in Cagayan in terms of the prevalence of hypertension with a total number of 6655 hypertensive patients. The respondents of the study were those patients with hypertension ages 18 and above, with the exception of pregnant women. Convenience sampling technique was used to identify the sample size needed in the study with the confidence level of 95% and margin of error of 5% which resulted in a total of 363 hypertensive patients included in the sample.

C. Instrument

In order to gather the data needed, this study adopted the Morisky Medication Adherence Scale (MMAS-8) that was used by the study of Khayyat et al., 2017. The Morisky Medication Adherence Scale (MMAS-8) was originally developed by Morisky et al., 2008. Furthermore, the researchers also gathered appropriate data through an adapted structured questionnaire which was used in the study of Pirasath et al (2021). In the adapted questionnaire, the researchers made some changes that were specifically suited to the locale of the study as well as to the involved respondents. The data gathering for respondents was assisted by the Barangay Nutrition Scholar and Barangay Health Workers to reach out to those hypertensive patients who were included in the list. But before administering the questionnaires, a consent form was presented to the respondents for their approval on the said data gathering.

To those who agreed to participate, a questionnaire was given to them.

D. Data Analysis

The Researchers used the Statistical Package for Social Sciences (SPSS) to analyze the information gathered. The profile of the respondents was summarized through frequency and percentage. Furthermore, the level of medication adherence was assessed through the 8-item Morisky Medication Adherence Scale (MMAS). Total scores for the MMAS were interpreted using the range below:

TABLE I. QUALITATIVE INTERPRETATION OF MMAS SCORE FOR MEDICATION ADHERENCE

Range of Total Score	Qualitative Interpretation
0-5.99	Low Adherence
6-7.99	Medium Adherence
8	High Adherence

Assessment of the predictors of medication adherence was done using mean and simple linear regression.

E. Ethical Considerations

Permission to conduct the research study was sought from every Barangay Captain of Tuao, Cagayan where the study was carried out. The researchers sought the approval of the respondents to participate in the study through a consent form that was given prior to the distribution of questionnaires. By these consents, the respondents were notified that there can be minimal risk for them if they decide to participate in this study. The respondents were also free to refuse or withdraw their participation in this study at any point of the data collection process if they feel that they are at risk.

Before the study was conducted, it was subjected to institutional ethical clearance as well as ethical clearance from the Region 2 Trauma and Medical Center Institutional Review Board and any research-related communication has been conducted with honesty and transparency, as well as false information or skewed depiction of main data findings were avoided.

The records of the respondents' profile and answers were kept confidential and were only accessible to the researchers. Any and all affiliations, funding resources, and any conflict of interest were disclosed as absent.

III. RESULTS AND DISCUSSION

TABLE II. DEMOGRAPHIC PROFILE OF THE RESPONDENTS

Variable	Categories	Frequency (n=363)	Percentage
Age	60 years old and above	136	37.50
	18-59 years old	227	62.50
Sex	Female	255	70.20
	Male	108	29.80
Employment Status	Unemployed	285	78.50
	Employed	78	21.50
Marital Status	Single	11	3.00
	Married	278	76.60
	Widowed	74	20.40
Monthly Income	₱43,828 - ₱76,669	1	0.30
	₱21,194 - ₱43,828	2	0.60
	₱9,520 - ₱21,194	13	3.60
	Less than ₱10,957.00	347	95.60
Highest Educational Attainment	Elementary Graduate	184	50.7
	High School Graduate	98	27
	Undergraduate	51	14
	College Graduate	24	6.6
	Master's Degree	6	1.7

Table 2 summarizes the respondents' Demographic Profile. A total of 363 respondents were interviewed, the majority belonging to 18-59 years old, female 255, married and widowed. A large proportion of the respondents were elementary graduates. Moreover, more than three fourth of the respondents were reported to be unemployed and having an income of less than 10,957.00 monthly.

In this current study, the majority of sampled hypertensive patients had low levels of medication adherence. Poor adherence to antihypertensive medications not only leads to poor blood pressure control, but it also hastens the development of hypertension-related complications and raises the rate of hospitalization. In line with the findings of this study, similar studies (Al-Ruthia et al., 2017; Khayyat et al., 2017; Jankowska-Polanska et al., 2017) have also documented poor medication adherence rates which is concerning given the negative consequences associated with non-adherence. One factor that influences adherence to prescribed medications is the cost of the medication. Patients who were prescribed more expensive drugs were less likely to take their medications as directed because they were more expensive (Paraidathathu et al., 2012). Accessibility to health workers and health services, patients who live far from health facilities, and those who do not have an immediate access to transportation have also an effect on the poor medication adherence of hypertensive patients. These findings highlight possible health care deficiencies in the urban setting and their impact on health outcomes (Mahmood et al., 2020). Numbers of pills taken daily was also a factor that influences a patient's medication adherence. An increase in a patient's number of pills decreases their medication adherence. This highlighted the importance of limiting the number of drugs prescribed to patients and the frequency of their daily doses. Hypertensive patients will adhere to their medication regimen better if it is kept simple (Paraidathathu et al., 2012). In addition, unavailability of antihypertensive medication in healthcare facilities is also a barrier to health care and is a factor in medication non-adherence. Poor medication adherence of hypertensive patients means that despite the current precautionary programs in place to address the persistent prevalent case of hypertension, as well as the various preventive actions of the health sectors especially the pharmacists and physicians, hypertensive patients' medication adherence should still be improved.

The findings of this study concerning the sociodemographic factors, health care system factor (patient- provider relationship), and health condition factor (control of blood pressure) show that of the sampled respondents were found to be independent predictors associated with higher medication adherence rates.

TABLE III. LEVEL OF MEDICATION ADHERENCE OF THE RESPONDENTS

Categories	Frequency (n=363)	Percentage
High	53	14.60%
Medium	95	26.17%
Low	214	58.95 %

Table 3 shows that more than half of the respondents (58.95%) had low adherence. This means that the respondents missed their medication dose due to forgetfulness, inconsistency and felt hassled about sticking to their treatment plan, while 26.17% and 14.60% had medium and high adherence levels, respectively.

TABLE IV. BIOCHEMICAL CHARACTERISTICS OF PATHOGENIC BACTERIA IDENTIFIED IN THE FOOD SAMPLES

	Dimensions	Mean Score	Qualitative Interpretation
Health Care System Factors	Patient-Provider Relationship	4.61	Factor
	Treatment Cost	1.06	Factor
	Geographical Accessibility	1.67	Factor
	Availability of Antihypertensive Drugs	2.15	Factor
Health Condition Factors	Control of Blood Pressure	1.37	Not a Factor
	Anti-Hypertensive Medication	1.90	Factor
Therapy-Related Factors	Duration of Anti-Hypertensive Medication Treatment	3.17	Factor
	Number of Pills Taken Daily	2.01	Factor
	Experience of Medication Side Effects	1.85	Factor
	Use of Non-Antihypertensive Medication	1.98	Factor
Patient-Related Factors	Knowledge of HTN Risk Factors	4.93	Factor
	Knowledge of HTN Related Complications	2.05	Factor
	Knowledge on Treatment Benefits	2.73	Factor
	Beliefs that BP Medications are Helpful in Controlling BP	3.00	Factor

The table above shows the different factors that affect the adherence to medications for hypertension as assessed by the respondents. It can be seen that all the identified dimensions were considered by the respondents as factors affecting their adherence except health condition factors specifically the control of blood pressure. It can be further gleaned from the table that these factors may either increase or decrease the respondents' level of adherence to their medication regimen.

TABLE V. RELATIONSHIP BETWEEN RESPONDENTS' DEMOGRAPHIC PROFILE AND THEIR LEVEL OF MEDICATION ADHERENCE

	R-value	p-value	Decision
Age	.433	.000*	Reject Ho
Sex	.054	.641	Do not reject Ho
Employment Status	.426	.002*	Reject Ho
Marital Status	-.104	.386	Do not reject Ho
Educational Attainment	.366	.004*	Reject Ho

* SIGNIFICANT AT 0.05 LEVEL

Table 5 shows that age, employment status and educational attainment are significantly related to the level of medication adherence of the respondents. Furthermore, it can be seen that age, employment status and educational attainment have a positive relationship with medication adherence. This implies that the respondents' level of medication adherence increases with age, their educational level and employment status.

TABLE VI. RELATIONSHIP BETWEEN RESPONDENTS' LEVEL OF MEDICATION ADHERENCE AND THEIR ASSESSMENT OF THE FACTORS AFFECTING ADHERENCE

	Dimensions	R-value	p-value	Decision
Health Care System Factors	Patient-Provider Relationship	.220	.028*	Reject Ho
	Treatment Cost	.057	.401	Do not reject Ho
	Geographical Accessibility	.035	.424	Do not reject Ho
	Availability of Antihypertensive Drugs	-.085	.092	Do not reject Ho
Health Condition Factors	Control of Blood Pressure	.125	.014*	Reject Ho
	Anti-Hypertensive Medication	.055	.373	Do not reject Ho
Therapy-Related Factors	Duration of Anti-Hypertensive Medication Treatment	.023	.709	Do not reject Ho
	Number of Pills Taken Daily	.028	.610	Do not reject Ho
	Experience of Medication Side Effects	-.092	.089	Do not reject Ho
	Use of Non-Antihypertensive Medication	-.013	.811	Do not reject Ho
Patient-Related Factors	Knowledge of HTN Risk Factors	.021	.508	Do not reject Ho
	Knowledge of HTN Related Complications	.055	.529	Do not reject Ho
	Knowledge on Treatment Benefits	-.079	.196	Do not reject Ho
	Beliefs that BP Medications are Helpful in Controlling BP	.086	.727	Do not reject Ho

* SIGNIFICANT AT 0.05 LEVEL

Table 5 shows that patient-provider relationship and control of blood pressure are significantly correlated with the level of medication adherence of the respondents. Moreover, these factors were found to have a positive relationship with medication adherence. This means therefore that the level of medication adherence of the respondents increases or becomes

better with better or higher patient-provider relationship and with better control of their blood pressure.

In this study, the patients' age shows a positive relationship with the medication adherence of hypertensive patients. This finding supports the findings of other studies stating that the age group 70–80 years had the highest average adherence rate. People appear to be increasingly concerned as they grow older and/or develop medical issues (AlHewiti, 2014; Meinema et al., 2015; Saeed et al., 2011). For instance, one of the studies which was conducted in Saudi Arabia, reported better adherence rate among hypertensive aged over 55 years than those younger than 55 years (48.5% versus 26.2%, $P < 0.001$) (Algabbani, F. & Algabbani, M., 2020). Higher medication adherence among older patients can be explained by the presence of a caregiver who would help them in taking their medicines'. Moreover, according to the Health Belief Model, older people are more concerned about their health and maybe more sensitive to side effects and show deterioration when their medications are disregarded; these factors likely drove them to enhance their treatment adherence (Khadoura et al., 2020). On the other hand, younger people were more likely to be non-adherent due to work related commitments and other priorities in their lives; therefore, may not be able to attend their clinic appointments and take their medicines as prescribed. This should be taken into account during patient counseling; consequences of hypertension, as well as the risks of poor drug adherence, should be thoroughly explained to patients in the younger age groups.

In this study, results showed that educational attainment and employment status were positively associated with the medication adherence of hypertensive patients. Previous research in the United States found that those with more education had higher rates of medication adherence (Cho et al., 2014). A Finnish study also explained the links between education and medication adherence as a result of an information-seeking attitude, claiming that higher education is linked to receiving more advice and information from a physician (Iqla et al., 2021). The study found out that education has a moderating effect on medication adherence. The findings could be related to McGuire's Information Processing Theory, which describes the impact of general intelligence on behavior change. According to this model, in order for someone to comply with a request, two factors must be present in order for someone to comply with a request or agree with a message: 1) reception (i.e., message comprehension), and 2) yielding (ie, accepting of the message). People with a higher IQ or a higher level of intelligence usually comprehend the message better than those with a lower IQ or low level of education. Therefore, a better level of education results in higher comprehension about the medications and the nature of the disease, resulting in better improvement of patient's adherence to their medications. In terms of employment status, a study conducted by Yu et al., (2020) found out that those who were employed were more likely to adhere to their medication. The reason could be because employed patients are can better afford the cost of medication while those who are unemployed and have low income are less likely to take their antihypertensive medications as prescribed. On the other hand, there was no association between sex, and marital status with a patient's medication adherence and this finding is consistent with Iranian study conducted by Sabouhi et al., 2011.

According to the findings of this study, under Healthcare System Factors, there is a positive relationship between patient and provider relationship towards the medication adherence of patients. This is supported by the study of (Noble, 2020), where he stated that quality efforts to facilitate physician-patient concordance may improve primary care outcomes. The findings showed that the respondents fully trust and respect the therapy plans and advice given by their healthcare providers. In addition, the respondents also emphasized that they were able to get the assistance they needed from their health providers. Hence, they could easily communicate with the health providers whenever they had questions and clarifications with regard to their therapy plans. However, the level of medication adherence of the respondents is still poor despite the health services they are receiving. This implies that there is still a need to further enhance the patient-provider relationship. Physician-patient communication about hypertension should be improved, as should clear instructions on antihypertensive medication. Patients' adherence to their antihypertensive medication should also be improved by education and counseling provided by health-care professionals. Improved communication with health-care providers and education about medications and the nature of the disease can help patients adhere to their medications more effectively. Identifying patients who are at high risk for poor adherence can aid in adherence interventions. Educational interventions are one type of intervention. Education may take the form of individual instruction or group classes. Behavioral approaches that use techniques like reminders, memory aids, and synchronizing therapeutic activities with routine life events can be effective interventions. By providing emotional support and encouragement, effective interventions aim to improve adherence. It is important to remember that a combination of different types of interventions is more effective than a single intervention. It is critical to discuss the obstacles that each patient faces and to work together as partners to overcome them. Only then will the full benefits of adherence and effective blood pressure management be realized. Hence, a better patient and provider relationship will surely result in a better adherence to their antihypertensive medications.

Blood pressure control was one of the factors associated with adherence behavior. In this study, the control of blood pressure shows a positive relationship to medication adherence. This result could be due to the reason that the respondents may have their own BP monitor in their homes or have their blood pressure monitored in the nearest RHU and also most of them tend to pay attention to what they eat to keep their blood pressure under control. Despite the interventions in place to address the prevalence of hypertension, the findings of study still show low medication adherence, implying that efforts to control blood pressure still need to be improved for better treatment outcome. Patients with better blood pressure control were found to be more adherent (Al-Ramahi, 2015). It might be attributable to a better outcome of the treatment which would provide the patient with a high level of satisfaction and may result in a strong motivation to complete the treatment. However, a poor outcome (uncontrolled blood pressure) may

leave the patient despondent and dissatisfied, prompting them to discontinue treatment, resulting in poor medication adherence. The result agrees with the findings of previous studies (Morisky et. al., 2013; Balasubramanian et al., 2018) where they found the same relationship.

Health care system factors like treatment cost, geographical accessibility and availability of antihypertensive drugs were not associated with adherence in this study. Same as with anti-hypertensive medication under health condition factor; duration of anti-hypertensive medication treatment, number of pills taken daily, experience of medication side effects and use of non-hypertensive medication under therapy-related factors. Patient-Related factors were also not associated with medication adherence: knowledge of hypertension risk factor, related complication, treatment benefits and beliefs that blood pressure medication are helpful in controlling BP.

IV. CONCLUSION

A high proportion of hypertensive patients in Tuao, Cagayan was found to have a poor adherence to medication. A set of predictors that positively influenced medication adherence of hypertensive patients in Tuao, Cagayan including age, employment status, educational attainment, patient-provider relationship, and control of blood pressure were observed in the current study. These findings of the study have important implications for better blood pressure control in Tuao, Cagayan. It implies the importance of addressing the need to design and implement interventions to improve adherence among hypertensive patients. As a result, the importance of the patient-provider relationship and better blood pressure control should be emphasized and enhanced. Furthermore, hypertensive patients and the general public should be provided with health educational strategies that focus specifically on medication adherence. It can be further improved by increasing their motivation, skills, and resources to follow doctors' and other healthcare providers' recommendations.

V. RECOMMENDATIONS

Based on the results of the study, to further improve the medication adherence of hypertensive patients, and manage the prevalence of hypertension in the Philippines especially in the study area that could serve as a benchmark for every hypertensive patient, the following course of actions are suggested:

Since this study found out that sociodemographic profile, patient-provider relationship, and control of blood pressure were strong relevant predictors of poor medication adherence of sampled population, the researchers therefore recommend that the health sectors especially the pharmacists should generate appropriate intervention programs that are effective in increasing the medication adherence of hypertensive patients and, in turn, to address the incidence of hypertension within or outside the sampled locality. The health sector may do as follow:

Patients require information to comprehend the significance of taking their medication exactly as prescribed. Therefore, it is recommended that the healthcare professionals should counsel the hypertensive patients every time they see a doctor to improve adherence to antihypertensive drugs and other necessary self-care measures to control hypertension. It is also suggested that health education be provided to improve patient knowledge and perceptions of hypertension and its consequences to increase compliance.

Health professionals must strive to develop positive relationships with their patients and, when necessary, screen for non-adherence factors and adjust counseling techniques accordingly. Access to providers across the continuum of care and implementing team-based care should also be ensured.

The researchers also propose that adherence questionnaires should be used routinely in hospitals and RHU for periodic evaluation in order to help identify patients who have poor adherence to their antihypertensive medication.

The researchers also recommend that health sectors allocate more blood pressure monitors to each Barangay, as well as continuous training for Barangay Health Workers, so that they can continuously monitor the blood pressure of hypertensive patients.

Furthermore, to provide patient-centered services, pharmacists' and pharmacy staffs' attitudes toward professional responsibilities must be re-oriented. They should always look for poor adherence and improve it by emphasizing the importance of a patient's regimen, making it simple, and customizing it to the patient's lifestyle. Health care professionals should help hypertensive patients develop systems to remind them to take their medications. All health professionals in the institution should work together to promote patient education and medication counseling.

As for future researchers, it is recommended that they look for more information that is needed to determine the unstudied factors associated with antihypertensive medication adherence. Effort must be done to continue finding them through longitudinal studies that preferably use objective instruments to measure adherence. These studies are required so that targeted interventions for medication adherence can be developed, which will ultimately improve mortality rates among hypertensive patients.

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