

## ORIGINAL ARTICLE

# Domains of Adherence and Non-Adherence to Anti-Hypertensive Medications in Hypertensive Patients from Kuala Lumpur: A Qualitative Study

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## ABSTRACT

**Introduction:** Previous medication adherence studies primarily focused on the domains of non-adherence in hypertension treatment and less attention has been given on domains that encourage adherence to anti-hypertensive medications. The current study is aimed to identify the domains of adherence and non-adherence to anti-hypertensive medications among hypertensive patients in Kuala Lumpur, Malaysia. **Methods:** Hypertensive patients from two public health clinics in Kuala Lumpur were invited for in-depth interviews until thematic saturation. Audio recordings from these interviews were transcribed verbatim. Transcripts were then analysed deductively with the guidance of the World Health Organization Medication Adherence Framework to extract the domains of adherence and non-adherence to anti-hypertensive medications. **Results:** Ten patients who were predominantly Malays and aged 34-73 years old participated the study. Patient-related (encompassing knowledge, attitude, belief and culture, lifestyle, personal barriers, self-efficacy, and cue to action), socioeconomic (encompassing social support), condition-related (encompassing nature of illness and presence of multiple co-morbidities), therapy-related (encompassing experience of receiving treatment, barrier in treatment, and side effects of treatment), and healthcare system (encompassing access to healthcare and healthcare center experience) domains were identified as central to the medication-taking behaviour of hypertensive patients. **Conclusion:** Sixteen codes of adherence and 22 codes of non-adherence to anti-hypertensive medications were identified, which were distributed across five domains (patient-related, socioeconomic, condition-related, therapy related, and healthcare system domains). These findings can help to inform future development of medication adherence questionnaires, individualised interventions for patients with adherence problems, and targeted health promotion programmes to reduce uncontrolled hypertension.

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## INTRODUCTION

The 2019 National Health and Morbidity Survey reported that the prevalence of hypertension in Malaysia was 30% (1). Despite the high availability of anti-hypertensive medications, there is still unsatisfactory control of blood pressure among hypertensive individuals, whereby 45% of the local hypertension patients did not achieve the targeted blood pressure (1). Of note, such uncontrolled hypertension could be attributed by patients' non-adherence to anti-hypertensive medications (2), as evident by various local adherence studies which

reported a high prevalence of non-adherence (24.2 – 51.3%) to anti-hypertensive medications (3-5). As such, substantial measures ought to be taken to understand the various reasons of non-adherence to anti-hypertensive medications among the local hypertensive patients.

Previous qualitative studies concerning treatment adherence have reported that hypertensive individuals did not take medicines either deliberately (i.e., intentional non-adherence) or not deliberately (i.e., unintentional non-adherence) (6). For instance, some patients intentionally omit drug taking in the absence of symptoms and they only took their medicines when symptoms of hypertension manifest (7). Other hypertensive individuals have reported to replace and supplement conventional anti-hypertensive medicines with a wide range of traditional and complementary

medicines which were perceived to be safer and natural (3). In the case of unintentional non-adherence, hypertensive individuals have described some external factors that limited their ability to adhere to treatment. These include forgetfulness (7), high expenses of anti-hypertensive medications (8), and not having medical insurance which prevented them from accessing health care services and hypertension medication (8).

Despite the various qualitative studies have been reported previously, only a few studies involving Malaysian population were conducted (9, 10). Of these, most of them mainly studied the domains of non-adherence in hypertension treatment (i.e., barriers) but generally give less attention the domains that encourage adherence to anti-hypertensive medications (i.e., facilitators) (11). As far as health promotion is concerned, the facilitators to anti-hypertensive medication is equally important as they can inform public health professionals to design interventions that can effectively empower and maintain patients' medication-taking behaviour (11).

To address this research gap, we conducted in-depth interviews to identify the domains of adherence and non-adherence to anti-hypertensive medications in a sample of hypertensive patients in Kuala Lumpur.

## MATERIALS AND METHODS

The study was carried out at two public health clinics in Kuala Lumpur. Phenomenology, which is an approach often used to understand a person's life experience (12), was used to explore the experience of anti-hypertensive medications use among hypertensive patients in Kuala Lumpur, Malaysia. Participants were recruited via purposive sampling technique, viz we went through the hypertension registries at the two public health clinics to identify individuals who are able to provide the information by the virtue of their experience (i.e., patients who are diagnosed of hypertension and who have experience of taking their medications). We then invited these individuals through phone call, during which they were briefed regarding the purpose of the study, potential benefits and risks, as well as being ensured the anonymity throughout the study.

On inclusion criteria, participants were recruited to the present study if they were 18-year-old and above, diagnosed of hypertension (i.e., defined as a persistently raised systolic blood pressure  $\geq 140$  mmHg and/or diastolic blood pressure  $\geq 90$  mmHg), had received anti-hypertensive agents for 6 months or above, and able to read and communicate in English language or Malay language. On exclusion criteria, patients were not recruited in the present study if they were diagnosed of secondary hypertension including renovascular disease, parenchymal kidney disease, Cushing syndrome, pheochromocytoma, and primary aldosteronism, were diagnosed of any kind of malignancies at the time of

recruitment, were suffering from mental health disorders and cognitive impairment at the time of recruitment, and were pregnant. Medical history and past records were used to establish the above inclusion and exclusion criteria. A booklet comprising informed consent forms, participant information sheets, and letter of ethical approval was provided to the participants upon their agreement to participate to the study. Ethical approval was granted by the Medical Research Ethics Committee, Ministry of Health, Malaysia (NMRR-18-3251-44694).

A bilingual interview schedule (in both English and Malay languages) was constructed using the Interview Protocol Refinement Framework (13). Using this framework as a guidance, efforts have been taken to make sure that all questions in the interview schedule (see supplementary material) are relevant and are able to cover as many aspects of medication-taking as possible (e.g., the experience with the illness itself, medications, healthcare professionals, healthcare facilities, etc). The bilingual interview schedule was examined by two primary school teachers who teach English and Malay language, respectively. Minor corrections have been made on grammatical errors and complicated sentences were paraphrased to ensure that the questions are easily comprehensible by the local community, open-ended, and non-suggestive in nature. This interview schedule help the interviewer to explore the barriers and facilitators of adherence to the anti-hypertensive medications.

Recruitment of participants for in-depth interviews took place until thematic saturation. Although statistical tests are available to determine the number of interviews required to achieve thematic saturation (14, 15), these approaches are still inconclusive in real life qualitative studies. Nonetheless, previous literature posited that a sample size of at least six participants is required in phenomenology qualitative study (16). Other literatures suggested that qualitative researchers using the approach of phenomenology may recruit up to 15 participants to achieve thematic saturation (17). With this evidence, we posited that 6–15 participants was adequate to achieve thematic saturation (18).

Due to the qualitative nature of the study, participants were considered to be adherent to the anti-hypertensive agents if they take their medication at the right timing, right dosage, and right frequency as prescribed. Domains of adherence (i.e., adherent or not adherent) were solely determined from their verbal description during the interviews and no quantitative methods of assessing medication adherence were used (e.g., questionnaire, refill frequency, pill count, etc).

There was only one interviewer in the present study, who is a bilingual speaker. The interviews were audiotaped and transcribed verbatim using NVIVO by the interviewer himself. Transcripts were then examined against the

audio recordings to ensure accuracy. Seven interviews were conducted in Malay language while another three interviews were done in English language. Different languages were used in the interviews to accommodate participants' language preference. Interview recordings in the English language were transcribed verbatim by the interviewer, while interviews conducted in Malay language were transcribed verbatim and translated into the English language by the interviewer. Constant comparative method was performed in the present qualitative analysis (i.e., each interview is transcribed and analysed before the next interview takes place so that findings of the previous interview is used to inform the following interviews). The transcripts were read thoroughly before meaning units were extracted and coded. As guided by the World Health Organization Medication Adherence Framework (19), which consists of five domains (i.e., patient-related, socioeconomic, condition-related, therapy-related, and healthcare system domains), deductive coding was conducted in the present framework analysis. To this end, all codes were organised into categories which subsequently combined into these five domains (or themes) of the World Health Organization Medication Adherence Framework. The rigour and quality of the present qualitative findings were ensured by conducting transferability, dependability, and confirmability tests (12, 20).

## RESULTS

In total, 13 patients were approached for in-depth interviews. Three patients were unwilling to be interviewed due to several reasons, such as time constrain, language barrier, and unable to fully understand the benefit of the study. At the end, only ten participants took part in the in-depth interviews. Their sociodemographic characteristics, disease status, and family information were listed in Table I. The age of the participants ranged from 34 to 73 years old. Of the 10 participants, nine were married, whereas one was single. The present sample was predominantly of Malay ethnicity. Only a quarter of the participants were employed at the time of the interview, whereas others were retiree. On average, the participants have been diagnosed with hypertension for 9.6 years. Taking into account of other co-morbidities, these participants take 1 to 4 types of medication on a daily basis. Across all interviews, almost all participants felt that they were adherent to the prescribed anti-hypertensive medications. However, upon further inquiry, mostly were found to be not adherent based on our definition of adherence either intentionally or non-intentionally as described below.

Overall, thirty-eight codes were extracted from the ten interviews. These codes were classified under 15 categories, which in turn organised into five domains of the WHO Medication Adherence Framework. These include patient-related, socioeconomic, condition-

related, therapy-related, and healthcare system domains. These domains were summarised in Table II below, along with their respective categories and codes.

### Patient-Related Domain

#### **Knowledge**

Lack of knowledge was reported as a barrier to adherence to anti-hypertensive medications. Participants were found to have insufficient understanding on the cause, symptoms, complications, and medications of hypertension.

*"Some medicines look like panadol, like panadol. I mean those for diabetes and high blood pressure. But I don't know their names. I really don't know. They just look like panadol. They gave me two types of medicines. They look like panadol. I don't remember their names". (S, 56 years old female)*

#### **Attitude**

Attitude is a double-edged sword that can either facilitate or hinder adherence to anti-hypertensive medications. Some participants seldom missed their medications as they had good self-discipline and were willing to follow instructions.

*"So far, I am okay, I just follow the usual procedure. I come to take medicine when I am asked to, and I go for blood taking when it is time. I will come when they ask me to come for ECG. I just follow the procedure. I am a teacher, not a doctor. So I must follow what the doctors tell, am I right? Now I am following doctor's instruction. If they ask me to take one pill, I will take one pill. If they add the dose, then I will follow". (Z, 37 years old, male).*

Nonetheless, some participants reported that laziness and ignorance have caused them not to take their medication regularly.

*"One more reason might be the attitude of taking things not seriously. There are many people at my workplace who have high blood pressure, some of them almost retired, some at their mid-career, some just joined. Some people bring their medicine to work and take it when it is time. Some of them simply ignore it. It mainly depends on the personality of that individual. It's their own problem. Each of them have their own excuses". (K, 45 years old, male)*

#### **Belief and Culture**

Few participants perceived hypertension as a serious illness which act as a facilitator of drug adherence. The illness was deemed as a serious condition as these participants understood the risk of uncontrolled hypertension, had observed their relatives who deceased due to the complications of hypertension, and raised concerns about the complications.

**Table 1: The sociodemographic characteristics, disease status, and family information of all participants**

Pseudonyms	Age	Ethnicities and Genders	Marital Status	Disease Status with Brief Family Information
K	65	Malay lady	Married in her 20s and blessed with four children.	Mdm. K has been diagnosed with hypertension for 38 years. She also suffers from other co-morbidities such as gastritis and chronic kidney disease. Initially, she was taking prazosin for her hypertension. Currently, she is on three types of anti-hypertensive medicines. She follows up regularly at Kuala Lumpur Health Clinic.
R	73	Indian male	Married in his 20s and blessed with three children and nine grandchildren.	Mr. R was diagnosed with hypertension at 63 years old. He is staying with his wife, who is a full-time housewife, in Cheras. He is taking amlodipine, perindopril and hydrochlorothiazide for his hypertension. At the same time, he is also taking metformin for his diabetes. Since June 2020, Mr. R has been follow-up regularly at Cheras Baru Health Clinic.
W	66	Chinese lady	Married and blessed with a son and three daughters.	Mdm. W was diagnosed with hypertension three years ago. She had a stroke four years ago. Her other co-morbidities include diabetes, dyslipidemia, and hyperthyroidism. She underwent a total thyroidectomy in 2000 at Pantai Hospital Cheras. Currently, she is taking amlodipine, metformin, simvastatin, and L-thyroxine. She is staying with her husband and two daughters at Bangi. She works as an assistant at a dental clinic at Cheras. Her husband is a salesperson selling furniture. She follows up at Cheras Baru Health Clinic.
L	70	Chinese male	Married and blessed with three daughters	Mr. L was diagnosed with hypertension in 2012. He has other co-morbidities including dyslipidemia and ischaemic heart disease. He is taking bisoprolol, perindopril, cardiprin and simvastatin. Mr. L suffered from throat cancer 30 years ago, which was treated at UMMC. He stays with his wife in Bangsar. Currently, Mr. L follows up at Kuala Lumpur Health Clinic.
K	45	Malay male	Married and blessed with three children.	Mr. K was diagnosed with hypertension in 2011, in concurrence with diabetes during one of his routine medical check-ups. Currently, he is on perindopril and insulin for his hypertension and diabetes, respectively. He is working as a ground staff at the airport, under POS Malaysia. The wife is a staff nurse back in Pahang. He follows up at Kuala Lumpur Health Clinic.
S	69	Malay female	Married and blessed with three children and eight grandchildren.	Mdm. S is a housewife. She was diagnosed with hypertension at the age of 55. Additionally, she has diabetes, ischaemic heart disease, stroke, and end-stage renal failure. Currently, Mdm. S is undergoing haemodialysis three times per week. She is staying with her retired husband and eldest son in Puchong. Mdm. S follows up and receives her medicines (perindopril, metoprolol, and metformin) at Cheras Baru Health Clinic.
Z	34	Malay male	Married and blessed with one daughter.	Mr. Z was diagnosed with hypertension in 2018. Besides that, he also has diabetes, dyslipidemia, and gouty arthritis. Initially, Mr. Z was started with perindopril. Subsequently, his doctor added metoprolol to the medicine regime. He is a sales advisor at Perodua Showroom. Currently, he is staying with his wife and his only daughter. He follows up every four months at Cheras Baru Health Clinic.
S	56	Indian female	Married but no children.	Mdm. S was diagnosed with hypertension in 2020. She is also diabetic. Currently, she is on amlodipine and metformin. She used to work in an electrical factory but retired in 2020. She is staying with her husband, who is deaf and mute. She follows up at Cheras Baru Health Clinic.
M	45	Malay male	Married and blessed with two children.	Mr. M was diagnosed with hypertension in April 2020. Currently, he is only taking amlodipine. He was a naval officer in the Royal Malaysian Navy but lately join the Royal Malaysian Police as a constable. He follows up at Kuala Lumpur Health Clinic.
Z	37	Malay male	Single	Mr. Z was diagnosed with hypertension in 2018. Initially, he was on perindopril but later changed to amlodipine due to side effects from the perindopril. Besides hypertension, he has dyslipidemia and hypothyroidism. He is a primary school teacher. He follows up at Kuala Lumpur Health Clinic.

*“I have a colleague at my workplace. He collapsed at home. He is comatose until now, he is paralysed, his whole body. When I learn about his story, I sort of have more awareness. Actually, he has high blood pressure and he was started on medicine but he stopped without advice from the doctor. He said he want to control his blood pressure by himself. At the end, he collapsed two years ago. Now he is paralysed. That is what I observe”. (Z, 37 years old, male)*

Being a multi-ethnic and multicultural society, drug adherence is heavily affected by cultural belief. A participant reported that his medicine-taking behaviour is substantially influenced by the traditional Malaysian culture, which generally give less preference for conventional medicine as they believe that anti-hypertensive medicines are hazardous chemical and, hence, they preferred traditional and complementary medications.

“I think that is because of our old thinking. I am from a

small village. We usually take traditional herbs from the village. I am also from the age of 70s. The elderly always tell us no need to go to hospital and no need to take medicine so much” (M, 45 years old, male).

### Lifestyle

Participants reported that they had practised healthy lifestyle and followed advice from the healthcare providers following the diagnosis of hypertension. These include the consumption of healthier food and engaging in physical exercise.

*“I walk around my neighbourhood. I went for Chi Gong class but I stopped going since MCO (movement control order). Then I do the chi gong at home. Yes, I find it useful. I feel relaxed after doing that. And I also do lower limb exercise”. (W, 66 years old, female)*

### Personal Barriers

Multiple personal barriers such as language barrier, lack of transport, and forgetfulness have prevented the

**Table II: Domains of adherence and non-adherence to anti-hypertensive medications**

Domains	Categories	Codes of Adherence	Codes of Non-Adherence
Patient-Related	Knowledge		<ul style="list-style-type: none"> <li>• Lack of understanding regarding the causes of hypertension</li> <li>• Lack of understanding regarding the symptoms of hypertension</li> <li>• Lack of understanding regarding the complications of hypertension</li> <li>• Lack of understanding regarding the medicine in hypertension treatment</li> </ul>
	Attitude	<ul style="list-style-type: none"> <li>• Self-discipline</li> <li>• Willingness to follow instruction</li> </ul>	<ul style="list-style-type: none"> <li>• Laziness</li> <li>• Ignorance</li> </ul>
	Belief and Culture	<ul style="list-style-type: none"> <li>• Perceived hypertension as a serious illness</li> </ul>	<ul style="list-style-type: none"> <li>• Use of traditional and complementary medications</li> </ul>
	Lifestyle	<ul style="list-style-type: none"> <li>• Healthy lifestyle</li> </ul>	
	Personal Barriers		<ul style="list-style-type: none"> <li>• Language barrier</li> <li>• Lack of transport</li> <li>• Forgetfulness</li> </ul>
	Self-Efficacy	<ul style="list-style-type: none"> <li>• Frequent blood pressure monitoring</li> <li>• Regular follow-up</li> </ul>	
	Cue to Action	<ul style="list-style-type: none"> <li>• Poor health status</li> <li>• Ageing</li> </ul>	
Socioeconomic	Social Support	<ul style="list-style-type: none"> <li>• Availability of social supports</li> </ul>	
Condition-related	Nature of Illness	<ul style="list-style-type: none"> <li>• Presence of hypertensive complication</li> </ul>	<ul style="list-style-type: none"> <li>• Asymptomatic state of hypertension</li> <li>• White coat hypertension</li> </ul>
	Presence of multiple co-morbidities	<ul style="list-style-type: none"> <li>• Better health concern due to multiple co-morbidities</li> </ul>	<ul style="list-style-type: none"> <li>• Need of multiple treatment due to multiple co-morbidities</li> </ul>
Therapy-related	Experience of Receiving Treatment	<ul style="list-style-type: none"> <li>• Easy access of medicines</li> </ul>	
	Barrier in Treatment		<ul style="list-style-type: none"> <li>• Multiple doses of medication</li> <li>• Use of multiple types of medications</li> <li>• Inability to differentiate the different types of medicine</li> </ul>
	Side Effects of Treatment		<ul style="list-style-type: none"> <li>• Side effects of anti-hypertensive agents</li> <li>• Afraid of side effects</li> </ul>
Healthcare System	Access to Healthcare	<ul style="list-style-type: none"> <li>• Easy access to healthcare services</li> <li>• Availability of medical insurance</li> </ul>	
	Healthcare Center Experience	<ul style="list-style-type: none"> <li>• Conducive clinic environment</li> <li>• Good physician-patient relationship</li> </ul>	<ul style="list-style-type: none"> <li>• Unconducive clinic environment</li> <li>• Bad experience during previous hospitalisation</li> <li>• Lack of continuity of care</li> <li>• Miscommunication with pharmacists</li> </ul>

interviewees to being adherent to their anti-hypertensive medicines.

*“But because I am not well educated, it’s hard to communicate in Malay language, I cannot communicate with them. I can barely communicate with them. They also do understand that I couldn’t understand Malay language well, so they spoke in a few short sentences. If I don’t understand, I will just say “oh”. I cannot communicate, so as my wife”. (L, 70 years old, male)*

### Self-Efficacy

Patients who have high self-efficacy such as having frequent blood pressure monitoring and maintaining regular follow-ups tend to have higher adherence to anti-hypertensive treatment.

*“I record the readings here in my mobile phone. I will show those readings to the doctors whenever they ask me to. But I am not consistent with blood pressure monitoring. I will do it whenever I remember. But at least, I do it once a week”. (Z, 37 years old, male)*

### Cue to Action

Cue to action such as poor health status and ageing were factors that improve drug adherence as patients who were physically weak. Also advanced age participants were more health concerned.

*“My body is not strong. I am old. I always fall sick. They suggested me for a surgery to unblock the veins. But my wife told me not to go for it and only stick to the medicines because my body is weak. I took such a long time to recover from cancer. I took such a long time to get stronger after the radiotherapy. My doctor told me not to do work that requires lots of energy and not to go under the sun. I am very weak”. (L, 70 years old, male)*

### Socioeconomic Domain

#### Social Support

Hypertensive patients received social supports during their course of illness in the form of reminder to take medicine, preparation of healthier diet, encouragement of healthier lifestyle, sharing of cost of healthcare,

and provision of transportation to healthcare facilities. Social support encourages the patients to be adherent to medications.

*"They do advise me not to be so hot-tempered, to be self-control when eating food, and do more exercise. Sometimes I forget to take medicine and my husband will remind me. My husband has a very good memory, unlike myself. He keeps his body well. He remembers well. He doesn't have diabetes and cholesterol though". (W, 66 years old, female)*

### Condition-Related Domain

#### Nature of the Illness

Two interviewees shared about the complications they experienced as a result of hypertension. The presence of hypertensive complications has been found to be a facilitator to medication adherence among these individuals.

*"I had stroke before. That was six years ago. It was a minor stroke. I was unable to walk for almost a month. Now I can walk, but not for long distance. I am ambulating well at home. At first, I fell to the ground when I was having my morning prayer. My legs were weak at that time and then I fell down. I fell in a sitting position. Then my son tried to hold me and help me to walk around my house. Subsequently, I am able to walk but my legs are not as strong as before". (S, 69 years old, female)*

In most cases, however, hypertension mostly present as an asymptomatic illness and this made the participants more reluctant to take their medications. In this regard, one of the participants mentioned:

*"I don't take the medicines whenever I feel that my condition is okay. I don't have any symptoms since I was diagnosed of high blood pressure. I think I have not taken more than ten pills in a month. Sometimes I feel that my blood pressure is high during work, but later when I measure the blood pressure, I realise that it's actually not that high" (K, 45 years old, male).*

White coat hypertension can also be a barrier to anti-hypertensive medications adherence. This is a frustrating condition for some patients as they might perceive that their blood pressure was uncontrolled even when they took the medication regularly. As a result, they tended to be non-adherent.

*"My blood pressure is okay at home. But when I come here to check, it is high every time. I don't understand why. It is really frustrating and makes me feel like giving up." (W, 66 years old, female)*

#### Presence of Multiple Co-morbidities

For some participants who were health concerned, the presence of multiple co-morbidities acts as facilitator to anti-hypertensive medications adherence.

*"I got cancer. I got cancer 30 years ago. I got throat cancer. A lump grew on my neck, like the size of an egg. I was working, working in an estate and when I woke up from sleep, I noticed that lump on my neck out of sudden, about 30 years ago. Therefore, now I am very concern with my health". (L, 70 years old, male)*

However, other participants deemed these co-morbidities as barriers to medication adherence due to the need of multiple treatments and follow-up appointments.

*"Usually, I don't take my medicine during my dialysis days. I feel troublesome and too tired to take those pills after my dialysis". (S, 69 years old, female)*

### Therapy-Related Domain

#### Experience of Receiving Treatment

All participants reported that they were able to obtain their supply of medicines with ease from the clinics. This has been a facilitator to anti-hypertensive medications adherence.

*"Getting medicines at the clinic is easy. Just go to clinic and the doctor give me my supply. Just wait for the queue number and I got them for free, every three months. (K, 65 years old, female)*

#### Barrier in Treatment

Barriers in treatment include the use of multiple doses of medication and the use of multiple types of medications. Advanced age participants were more likely to encounter such challenges.

*"I will take one pill for two types of medicines, and half a pill for the other two types. Two medicines in the morning and another two at night. In the morning, I take one pill for one of the medications and the other I take half a pill. Similarly, at night I will take one pill for one of the medications and half a pill for another one. I cannot remember sometimes". (L, 70 years old, male)*

Unable to differentiate the different types of medicine was found to be another barrier of anti-hypertensive medications adherence.

*"I mixed up the cholesterol and blood pressure pills. There were a few days which I regarded the high blood pressure pill as cholesterol pill. I took it at night instead of in the morning. And sometimes when I took double doses of high blood pressure medicine accidentally, I skipped the next morning dose". (Z, 37 years old, male)*

#### Side Effects of Treatment

Presence of side effects (e.g., insomnia, dizziness, and tiredness) following ingestion of anti-hypertensive medicines is a common determinant of non-adherence.

*"They used to give me a different medicine for high blood*

pressure previously. I feel weak and sleepy after taking it. That is why they changed to this current medicine since last November. Previously it was a different medicine. I can't remember the name. I have thrown it away. But I felt tired, dizzy and all after taking it. So, I didn't take it and threw it away. Maybe the medication is not suitable to me". (R, 73 years old, male)

Afraid of the side effects of anti-hypertensive medications is another factor in preventing medications adherence in hypertension treatment. Such fear will result in low adherence.

"We are afraid. People said once we are started on medication, we cannot stop taking it". (S, 69 years old, female)

### Healthcare System Domain

#### Access to Healthcare

Almost all participants mentioned that they have easy access to healthcare services. This encourages them to adhere to their anti-hypertensive medications.

"I had all my medications free of charge. All are provided, except one medicine that I have to purchase outside as it is too expensive. I will need to buy that from the local pharmacy. Not for blood pressure but it is a diabetic medicine. That time I was still not considered an elderly so I paid five ringgits. But now I am a senior citizen, so it's totally free of charge". (W, 66 years old, male)

Although insurance coverage was not commonly reported in previous literature, one participant mentioned that the availability of medical insurance provided a peace of mind to him and had encouraged him to take his medicine regularly.

"My company provides panel doctors. But they only provide private hospitals coverage to a certain high-ranking officer. For me, they provide coverage for public hospital and general practitioners. But I have no problem with it, as long as I am covered. They provide fifteen thousand annually for hospital admission. And for panel clinic, they provide three to five thousand in a year. That allows me to continue my follow-up and get all sort of medicines at the private clinic". (K, 45 years old, male)

#### Healthcare Centre Experience

Healthcare centre experience is a socio-environmental factor that affects medication adherence. While two participants felt not quite comfortable at the clinic due to the huge crowd and long queue, other participants were generally satisfied with the clinic's environment.

"The clinic has a huge crowd. I have to wait for hours as there are a lot of people. Just have to wait patiently

according to the queue number. Not quite comfortable, I would say. Too many people. Sometimes I feel like not going there". (K, 65 years old, female)

Despite the heavy workload and long queue at the clinics, two participants described that they had moderate-to-good relationship with their physicians. No concern or complains raised by all participants regarding the doctor treating their illnesses. When asked about his relationship with his doctor, one participant made the following comment:

"So far, I have not met any rude doctor. I prefer to go for the morning appointment. I understand that we are all human. If we work from morning till afternoon, we must feel tired. So when I take the morning appointment, the doctor will be more cheerful and have less problem. I have no problem with the doctors but I am not sure for the patients in the afternoon appointment though". (Z, 34 years old, male)

Bad experience during previous hospitalisation was mentioned by one participant. As a result, he had negative feeling to medicines in general, contributing to non-adherence to anti-hypertensive medications. He expressed his experience as below:

"My left and right hands were injected for drips and insulin. I think they gave me more than fifty bottles of drips throughout my stay. My weight was eighty plus before I fell sick. Then after that admission, my body weight fell to fifty plus. The changes are so obvious. I am so scared of medicines right now" (M, 45 years old, male).

The lack of continuity of care has also negatively affect adherence in hypertensive treatment.

"I am not blaming anyone. Just that in the clinic, I notice different doctor attend to me every time I go for appointment. I would prefer the same doctor to attend to me throughout". (K, 45 years old, male)

A good and effective communication with healthcare professionals is paramount in ensuring medicine adherence. When asked about the communication with pharmacist, one participant shared his recent event of miscommunication with the clinic's pharmacist, which has resulted in discontinuation of medication supply.

"The pharmacist did not inform me that I have to come back to take my medicine once it finishes. She did not tell me to come on a certain day to replenish my medicine. So I didn't take the medicines for a few months, not knowing that the medicine provided will not last till the next appointment. She should have informed me the next date for me to take the medicine". (K, 45 years old, male).

## DISCUSSION

The present qualitative study aimed to identify the domains that explain patients' adherence and non-adherence to anti-hypertensive medications. Results suggest that patient-related domain (encompassing knowledge, attitude, belief and culture, lifestyle, personal barriers, self-efficacy, and cue to action), socioeconomic domain (encompassing social support), condition-related domain (encompassing nature of illness and presence of multiple co-morbidities), therapy-related domain (encompassing experience of receiving treatment, barrier in treatment, and side effects of treatment), and healthcare system domain (encompassing access to healthcare and healthcare center experience) were central to the medication-taking behaviour of hypertensive patients.

With respect to the patient-related domain, some participants had little or insufficient understanding regarding the causes, symptoms, complications, and medicines of hypertension. Although they were able to attribute the causes of hypertension to high sodium diet, lack of sleep, stress, and positive family history of hypertension, most were unable to mention other common causes such as smoking, ageing, being overweight or obese, sedentary lifestyle. They were also able to identify stroke as one of the complications of uncontrolled hypertension but only a few can recognise myocardial infarction and renal disease as other main complications. Other participants were unable to recall the names of their medications due to low education, physical appearance of the medicines that mostly look alike, and long names of the medications. They were only able to recognise the medication by the appearance of the packet or label. The findings of the present study are in agreement with previous hypertension studies whereby the lack of knowledge about the illness (21), complication (22), and medication (23) are associated to non-adherence. Given the importance of patients' education in improving medication adherence, healthcare providers should, therefore, empower their patients via the provision of education regarding the illness and medications. One effective approach of educating hypertensive patients is via the use of digital health, specifically mobile health as reported by two local studies (24, 25).

As a developing nation, the behaviour of health-seeking in Malaysia always involve medical pluralism, in which the patients tend to use an alternative system of disease healing. Similar to other studies (26, 27), it was obvious that patients in this study placed much emphasis on traditional and complementary medicine (TCM) compared to conventional western therapy. This is because the participants perceived that such TCM produce less side effects compared to chemical drugs, a similar finding in an adherence study conducted in Iran (26). Although other local studies suggested that patients

with chronic illnesses give more preference to TCM due to the perception that TCM offers better value for money (28), choose to follow the steps of friends and family (28), as well as to follow the culture and tradition (29), these reasons were not reported by our participants.

The participants generally engage in a healthier lifestyle after being diagnosed of hypertension. Their diet contains less salt and saturated oil. Some started to engage with regular exercise such as brisk walking, cycling, gym, gardening and Chi Gong. The practice of healthy lifestyle ensures a better blood pressure control, which in turn reduces the need of extra prescription of medicines (30). When such medication-related burden is reduced, hypertensive patients, especially among the elderly community may be more willing to adhere to their medicines (31). However, Akbarpour et al suggested that lifestyle modification shall not be a substitute over the use of medications in blood pressure control (30).

Forgetfulness was another barrier in medication taking that commonly reported by many participants. This was especially true in patients who were taking multiple drugs. Such barrier can be removed via various strategies, including patient reminders, self-management, behavioural modifications, and personalised dosage systems (32). Although researchers have proposed the use of digital health technologies such as text messaging, interactive software technology, telemedicine, and interactive voice response to remind patients regarding their medications, the effectiveness of these technologies in improving medication adherence is still inconclusive (33).

For participants who always monitor their blood pressure, either at home or at the local pharmacy, frequent measurement of blood pressure acts like a reminder for them to take medicines. Previous qualitative studies found that individuals who monitor their blood pressure at home were more eager to discuss their blood pressure control with their physicians (34). Hence, any acute raise in blood pressure secondary to non-adherence can be detected and managed instantly.

With respect to the socioeconomic domain, almost all participants reported positive effects of social support on adopting healthy lifestyle. This, in turn, encourages the patients to be adherent to their anti-hypertensive medications. Relatives and friends of the participants played an important role to improve medication adherence. This finding was in agreement to previous studies (35, 36). Their influences were so significant that the patients obeyed their family members much more than the advices from their health care providers. On the contrary, patients may feel alone in confrontation with the disease and treatment if the family attention and cooperation is lacking, which in turn results in disappointment, worry, and fear within the patients (37).



With respect to the condition-related domain, when patients did not experience any symptoms and/or complications of hypertension, they tended to put less attention to treatment and to ignore their doses of hypertensive medicines, hence, results in non-adherence. However, they should be educated that even if the patients are asymptomatic, hypertension is a silent killer that may result in cardiovascular complications, such as stroke and myocardial infarction (38). Interestingly, the presence of co-morbidities may either act as a barrier or facilitator to anti-hypertensive medications adherence. To explain this, it was known that patients with multiple illnesses are more health concern because they are suffering multiple diseases and, hence, more adherent to their medications. On the other hand, however, the presence of co-morbidities forces the participants to take a daily regime of multiple medications and to attend multiple follow-up appointments, hence, a burden and barrier for medication adherence. Such finding is line with previous studies in which taking too many medications at one time was found to be a barrier of medication adherence (39, 40)

With respect to the therapy-related domain, since most hypertensive patients are taking multiple medications, previous study has suggested to reduce the number of daily doses via introduction of combined medications as a measure to effectively increase adherence to anti-hypertensive medications (41). Nonetheless, one should be aware that combined medications are not often available at public health clinics in Malaysia due to its cost. Some patients in the present study described their experience of having side effects while taking the anti-hypertensive medications. Additionally, concern was raised regarding the possibility of the medications leading to dependence and renal failure. Eventually, these worries lead to low level of drug adherence. This is in agreement to previous adherence studies, which also reported that the side effects due to the anti-hypertensive medications as well as patients' concerns regarding dependence to medicines have resulted in poor adherence among hypertensive patients (42, 43).

With respect to healthcare system domain, having access to healthcare services in Malaysia is not difficult given what has been practiced in the country (i.e., universal health coverage) (44). Participants can enjoy a comprehensive healthcare service at affordable or even at no cost in Malaysia. This finding is consistent with another study done in Malaysia (9). Such accessibility to affordable healthcare services could have improved adherence to anti-hypertensive medication. Lack of continuity of care, which is another category of healthcare center, represents a common problem in Malaysia's health care system. Despite many measures have been carried out at the clinics, including the family doctor concept (i.e., assigning the patients to a particular doctor at the clinic according to their residing location) in 2013 (45), many patients still do not have the chance

to meet the same doctor during each clinic visit. As such, patients' adherence to medication would be compromised if the subsequent doctors were unaware of the socioeconomic status and/or cultural aspect of the patients, unable to recognise side effects previously experienced by the patients, and failed to create a comfortable environment or to gain trustworthiness from the patients to share their thoughts regarding the treatment plan.

Based on the present qualitative findings, anti-hypertensive medication taking behaviour could be regarded as a continuum from adherence to non-adherence. Most patients adhere and non-adhere to different domains according to the way they construct meaning to those domains.

### **Strengths and Limitations**

As far as research novelty is concerned, a semi structured interview schedule based on the four-step Interview Protocol Refinement Framework (13) was developed. With this framework, open-ended questions were constructed in an inquiry-based conversation fashion to accommodate participants from different socio-demographic subgroups, considering Malaysia is a multi-ethnic country.

Nonetheless, the present study is not devoid from limitations. Only hypertensive patients from public health clinics were recruited. It is plausible that hypertensive patients receiving treatment at private clinics may provide different viewpoints regarding their medication-taking behaviour, especially in terms of the cost of medicine, severity of illness, and the presence of hypertensive complications. Another limitation is related to the transferability of the domains identified in the results, which must be treated with caution, as the present study focused only on hypertensive patients. Future studies should explore whether these domains can be extended into other medical condition. Thirdly, since the interviewer is a clinician, this may lead to an imbalance in power between the interviewer and the participants, leading to social desirability bias and response bias. To minimise this, the interviewer attempted to focus on the similarities between himself and the participants (i.e., as someone with hypertensive family members and not to highlight any differences in socioeconomic status). The interviewer also clarified his intentions to the participants as not simply a researcher wanting to conduct research for his own academic benefit, but as a person who is interested in understanding their views and experiences better so that appropriate intervention can be offered to them in future.

Another limitation is that backward translation (46, 47) of the interview schedule was not conducted. However, since the in-depth interviews in both languages (i.e., English and Malay) was conducted by the same

researcher (who was also the creator of the interview schedule), the congruency, conceptual equivalence, and true meaning of the questions in both versions of the interview schedule were well maintained. Lastly, since interviews conducted in Malay language were first transcribed verbatim to Malay language, which were then translated to the English language and subsequently analysed thematically in English language, this method may be prone to the risk of losing the original meaning of the audio recording. However, efforts have been taken to ensure that the translation was performed accurately by a fluent bilingual translator.

## CONCLUSION

Sixteen codes of adherence and 22 codes of non-adherence to anti-hypertensive medications were identified, which were distributed across the five domains of the WHO Medication Adherence Framework. These include the patient-related, socioeconomic, condition-related, therapy related, and healthcare system domains.

For the purpose of clinical research, the findings from the present study can inform future researcher to develop valid, reliable, and multidimensional questionnaires that are useful to assess anti-hypertensive medication adherence behaviour, based on the five themes generated from the in-depth interviews.

In terms of clinical practice, a key implication of the present study relates to the improvement of clinicians' awareness regarding the challenges of taking long-term usage of anti-hypertensive medications faced by their patients. Once identified, individualised interventions can be offered to address specific barriers. Targeted psychoeducation can be offered to patients who think they are not susceptible to hypertension complications. Patients experiencing problems with an unhealthy lifestyle could be referred for dietary consultation with dieticians or referred to a quit smoking clinic for smoking cessation therapy. If poor doctor-patient relationship is identified as a barrier to medication adherence in hypertension therapy, doctors ought to be better trained on communication skills so that they can deliver care in a more empathetic and sympathetic manner.

In terms of policy-making, the outcomes from this study may help public health officials to understand the relative importance of different domains of medication non-adherence and how they interact, which in turn, guide the Ministry of Health, Malaysia to design effective health promotion programmes as an effort to reduce the prevalence of uncontrolled hypertension.

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