

Exploration of the Public's Perspectives on Medication Safety in Taiwan: A Cross-sectional Study

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ABSTRACT

This cross-sectional study explored salient risk factors associated with medication adherence among the population in Taiwan. A 64-item questionnaire tapping into sociodemographic background, health status, health literacy, medication adherence, medical status, medication safety, and perceptions of medical care received was developed and administered to 226 adult participants. Results from the multiple linear regression analysis indicated that employment was associated with decreased medication adherence ($\beta = -0.179$, $p = 0.013$). Lack of patient-pharmacist communication and confusion about medication-related information hindered patients' decision-making of medication use. To increase patients' awareness of proper medication use, providing easy-to-read education materials of medication use is necessary. In addition, pharmacists are encouraged to tailor pharmaceutical care by addressing the barriers to medication use identified from this study.

Key words: adherence, health literacy, pharmacist, medication, safety

1. Introduction

Initiated by the Patient Safety and Risk Management Unit at the World Health Organization (WHO) in 2017, the *Global Patient Safety Challenge on Medication Safety: Medication Without Harm* aims to reduce severe yet avoidable medication-related harm by 50% by 2023 (Donaldson et al., 2017; Sheikh et al., 2017). In order to achieve this goal, the challenge seeks to bring about improvements in four areas: the quality of medicines, the comprehensive prevention of errors in the medical system, the provision of appropriate education and monitoring by health professionals, and the participation of the public, emphasizing the importance of a better understanding of medication among patients. At various stages of medication taking—before and during medication use, when increasing the dosage, when making a regular review of the medication regimen, and when discontinuing the medication—health professionals need to take an initiative in providing patients with appropriate information, in accordance with the twin goals of improving

the general public's health literacy and reducing the risk of medication errors (WHO, 2019). Therefore, the provision of appropriate health education for patients is key to the success of drug treatment.

Over the past two decades, research on patients' perspectives on the medication safety in Taiwan has indicated a need to improve patients' medication adherence by addressing their health literacy and understanding other salient self-reported outcomes (e.g., health status) related to medication safety (Hsiao et al., 2006; Huang et al., 2020; Lee et al., 2017; Wen et al., 2007). Research based on Taiwanese population has documented that 20%–40% of the general public face various types of barriers to medication use, including difficulties of navigating the healthcare system and utilizing pharmacist's counseling resources, as well as lacking the knowledge of medication use (Hsiao et al., 2006; Huang et al., 2006, 2015; Lee et al., 2017). Whereas the findings resonate with existing research on medication-related problems based on Western populations (e.g., consumer engagement, cost of medications; Eassey et al.,

2016), there is sparse research of linking these risk factors to medication safety in Taiwan. Due to the unique healthcare system and cultural background, the findings from other countries may not well fit the situation in Taiwan. Since pharmacists are recognized by the general public as one of the major credible resources of medication information in Taiwan, empirical research in this field can help pharmacists better serve the customers when medical professionals are able to tailor services to patients' need in order to improve their medication safety, accordingly.

In response to the issue of medication safety, Taiwan Food and Drug Administration (TFDA) commissioned the Taiwan Society of Health-System Pharmacists (TSHP) to carry out this nationwide study in 2018. In order to gain a deeper understanding of the use of medications among the general public in Taiwan and the general public's awareness of medication safety and pharmaceutical services, this study aimed to investigate risk factors associated with medication adherence and perform a needs assessment of patients in regard to medication safety and pharmaceutical services. For this purpose, we formulated the *Medication Use among the General Public Questionnaire* (TSHP, 2018) for data collection. It is expected that the findings can be used to tailor existing pharmacy practice to improve the delivery of patient-centered pharmaceutical care.

2. Materials and Methods

2.1. Study design

This cross-sectional study was conducted using a questionnaire that was administered face-to-face at 12 hospital pharmacies and 1 community pharmacy located across different regions in Taiwan from June to September 2018. All study procedures involving human subjects were approved by the Research Ethics Committee of the National Taiwan University Hospital (201806002RINA). Written informed consents were obtained from all participants prior to their enrollment in this study.

2.2. Conceptual framework for the questionnaire development

Based on the study of Eassey et al. (2016) on the conceptualization of medication-related problems and the study of Morisky et al. (2008) on the evaluation of medication adherence, we identified and adopted the constructs relevant to the evaluation of medication use. Besides, we reviewed related publications by the Joint Commission of Taiwan, the European Union, and the Institute for Safe Medication Practices in the United States. By analyzing and collating this information, we developed the 64-item *Medication Use among the General Public Questionnaire* (Appendix). In addition to the sociodemographic background (8 items), the questionnaire encompasses six sections related to medication use: (1) health status (6 items); (2) health literacy (3 items);

(3) medication adherence (7 items); (4) medical care status (9 items) (5) medication safety (8 items); and (6) perceptions of medical care received (23 items). Each item was designed as either a multiple-choice or open-ended question. To ensure the questionnaire's content validity (Haynes et al., 1995), a preliminary version was revised by 9 representatives of the pharmaceutical societies and associations and consumer groups using a 5-point Likert-type scale (1 = *strongly disagree*, 5 = *strongly agree*) and open-ended comments. A content validity coefficient based on the Aiken formula was used to evaluate the revised questionnaire after incorporating the suggestions from the experts (Aiken, 1980), and a coefficient equal to or greater than 0.80 is deemed excellent (Shi et al., 2012). Internal consistency was tested by Cronbach's alpha, in which a coefficient equal to or greater than 0.70 is considered acceptable (Cortina, 1993). After the integration of inputs from pharmacy experts and consumer groups, the final version of the questionnaire had a good content validity (coefficient = 0.84) and internal consistency (Cronbach's alpha = 0.75).

2.3. Participant recruitment

To ensure adequate statistical power, a priori power analysis for a multiple linear regression with 11 predictors was conducted using G*Power 3.1 with power set at 0.80 and $\alpha = 0.05$ (two-tailed; Faul et al., 2009). As a result, a sample of at least 123 participants were required to reach a medium-sized effect ($f^2 = 0.15$; Cohn, 1988; Faul et al., 2009).

A convenience sampling was used to recruit participants. Eligible participants were self-reported 18 years of age or older, Mandarin speaking, currently prescribed one or more medications for diseases management, or the primary caregiver (e.g., family member or caretaker) who took care of a person using one or more medications for diseases management. Individuals who were younger than 18 years old, too ill to participate in the questionnaire, presently not using any oral medications for disease management, or unable to understand Mandarin were excluded. At the research sites, trained pharmacists took potential participants into a private area to describe the project, obtain informed consent, confirm their eligibility, and complete the questionnaire. This nine-page paper-and-pencil questionnaire took participants 15–20 min to complete. Participants were compensated a US \$5 gift card for their time upon completion of the questionnaire.

2.4. Measurements

2.4.1. Demographic and other characteristics

Participants responded to 8 items on their socio-demographic information, including gender, age, residence, health insurance status, whether having healthcare professionals in the family, housing arrangement, occupation, and the highest level of education.

2.4.2. Health status

Health status was assessed using the 6-item, Taiwanese version of EuroQol five-dimensional (EQ-5D) measure, a widely used reference-based measure of health among people with chronic diseases (Lin et al., 2018). The EQ-5D instrument includes five dimensions related to health (i.e., mobility, self-care, usual activities, pain/discomfort, and anxiety/depression) measured with five levels (1 = *no problem*, 5 = *unable to perform*), as well as a self-rating of health using a visual analogue scale (EQ-VAS; Lin et al., 2018). In the EQ-VAS, participants are asked to indicate their perceived health on a vertical visual analogue scale (0 = *the worst imaginable health*, 100 = *the best imaginable health*). The sum of health status scores ranges from 5 to 25, and a higher score indicates more problems in performing daily activities. The responses were reverse-scored, such that higher scores indicated a better health status.

2.4.3. Health literacy

Health literacy was measured by the 3-item brief health literacy screen (BHLS), which tested the respondent's skills of literacy, comprehension, interaction, and confidence (Chew et al., 2004; Haun et al., 2014). The BHLS is a validated perception-based assessment of health literacy that has been validated via face-to-face administration and extensively used across different studies on people with chronic diseases (Cavanaugh et al., 2015; Chew et al., 2008). Each question is scored on a 5-point Likert scale (1 = *never*, 5 = *always*) and is summed to yield a total score ranging from 3 to 15 (Chew et al., 2004). Higher scores indicate higher subjective health literacy.

2.4.4. Medication adherence

Medication adherence was evaluated using 7 self-reported items informed by literature review (Lam & Fresco, 2015; Morisky et al., 2008). Each question asks participants about their daily experiences regarding self-administration of their prescribed medications with a dichotomous response option (1 = *no*, 0 = *yes*). The 7 items were summed up with a total adherence score ranging from 0 to 7, with higher scores indicating better medication adherence.

2.4.5. Medication-related questions: medical care status, medication safety, and perceptions of medical care received

Medical care status, medication safety, and perceptions of medical care received were measured by 9, 8, and 23 items, respectively, which were developed based on literature review and consideration of the unique healthcare practice in Taiwan (Eassey et al., 2016; Wen et al., 2007). These medication-related questions are used to collect participants' experiences of seeking medical care, navigating medication information, engaging in shared decision-making of medication use, and understanding of prescribed medications. Each question is designed as either an open-ended question or a multiple-answer question.

2.5. Data analysis

Descriptive statistics, including mean, standard deviation (SD), and frequency were used to summarize the characteristics of the study samples. All continuous variables were expressed as the mean \pm SD, and categorical variables were expressed as numbers and percentages. In the multiple linear regression, the outcome variable was medication adherence, and the independent variables included age, gender, education, residence region, housing arrangement, occupation status, whether having healthcare professionals in the family, health literacy, and health status. The multi-categorical independent variables were collapsed into dichotomous variables to minimize the risk of losing statistical power. The highest level of education was divided into two groups by using attainment of a bachelor's degree as the cutoff point. In addition, we used three dummy variables to distinguish the region of residence from four groups. All statistical analyses were conducted using SPSS version 26, with the statistical significance level at a two-sided $p < 0.05$.

3. Results

A total of 240 individuals were approached, and 226 (94.2%) participants were enrolled and later completed the questionnaire, including 94 (41.6%) in northern Taiwan, 39 (17.3%) central, 79 (35.0%) southern, and 14 (6.2%) eastern. Among these, 206 (91.2%) individuals completed the survey at hospitals or clinics, and 20 (8.8%) in community pharmacies. These participants, predominantly female ($n = 140$, 61.9%), had a mean age of 53.2 years ($SD = 18.8$ years; ranging from 19 to 92 years old). Approximately half of the participants ($n = 107$, 47.3%) had a bachelor's degree or higher. All of the participants joined the National Health Insurance in Taiwan, and more than half of them ($n = 118$, 52.2%) had no healthcare professionals in their family. The majority of the participants ($n = 213$, 94.2%) lived with relatives, and 118 (52.2%) had either full-time or part-time jobs (Table 1). The average scores of health status, health literacy, and medication adherence were 23.2 ± 3.1 , 10.9 ± 2.8 , and 4.9 ± 1.4 , respectively. The average score of the EQ-VAS was 76.4 ± 14.4 (Table 1).

3.1. Association between health status, health literacy, and medication adherence

Health status ($\beta = 0.135$, $p = 0.072$) and health literacy ($\beta = 0.139$, $p = 0.064$) were not associated with medication adherence. However, having a job ($\beta = -0.179$, $p = 0.013$) was negatively associated with medication adherence after controlling for the covariates ($R^2 = 11.0\%$, $p = 0.008$; Table 2). Patients with full-time or part-time jobs were less likely to adhere to their medications.

3.2. Medical care status

Regarding the level of functioning, 85% of the patients required no assistance in taking their medications, while the

Table 1. Descriptive statistics of the study participants (n = 226).

Variables	n (%)	Mean (SD)
Age (years)		53.2 (18.8)
Gender	140 (61.9)	
Female	86 (38.1)	
Male		
Highest level of education		
Secondary school or below	46 (20.4)	
High school graduate or equivalency	54 (23.9)	
Associate's degree	19 (8.4)	
Bachelor's degree	75 (33.2)	
Graduate degree (MS or PhD)	32 (14.2)	
Region of residence		
North	94 (41.6)	
Middle	39 (17.3)	
South	79 (35.0)	
East	14 (6.2)	
Housing arrangement		
Living with others	213 (94.2)	
Living alone	13 (5.8)	
Occupation status		
Full or part-time job	118 (52.2)	
Others	108 (47.8)	
Having healthcare professionals among family members		
No	118 (52.2)	
Yes	108 (47.8)	
Health status (score = 5–25)		23.2 (3.1)
EQ-VAS (score = 0–100)		76.4 (14.4)
Health literacy (score = 3–15)		10.9 (2.8)
Medication adherence (score = 0–7)		4.9 (1.4)

remaining 15% required some assistance, mainly provided by their children or spouse. Among the participants over 65 years of age, 31% required assistance in taking their medications, while for those under the age of 65 only 8%

required assistance. Of various medical institutions in Taiwan (e.g., hospitals, clinics, Chinese medicine clinics, and community pharmacies), 82.3% of the participants regularly visited a hospital. As for the frequency, 81.0% of the patients had visited a medical institution five times or less during the previous three months, but a few patients had visited medical institutions more than 20 times in the past three months.

Table 3 describes the types of medication that participants reported in this study. The five leading items of which are drugs for cardiovascular disease (42.5%), vitamins or health supplements (29.6%), cholesterol-lowering drugs (23.0%), diabetes drugs (19.9%), and anticoagulants (17.7%). In addition, 27.4% of the participants indicated that they spent the largest amount of medication cost on health supplements, which are widely used in Taiwan. As for the number of concurrent medications, 19.9% of the patients were taking more than five items; among the participants over the age of 65, this increased to 48%.

3.3. Medication safety

Sixty-five percent of the participants indicated that they had at least one medication-related problem, and the most common of which was the confusion stemming from getting a prescription refilled with a medication corresponding to its generics with the same amount of ingredients. About 29.6% of the participants reported having such experiences. The second problem raised was being unable to fill a prescription because the required medication was out of stock, and 21.2% of the participants reported they had this experience at least once. As for problems related to the medication use, the common problems were an allergic reaction to the medication (14.6%), duplicated medication (11.5%), and storage-related problems (10.2%; Table 4).

Among the participants (n = 124) who have experienced a

Table 2. Predicting medication adherence regressed on demographics, health status, and health literacy (n = 226).

	Dependent variable: medication adherence			
	B	SE	β	p value
Demographic factors				
Age	-0.002	0.006	-0.032	0.694
Male	-0.059	0.198	-0.020	0.767
With B.S. degree or higher ^a	-0.420	0.214	-0.147	0.051
Living with others	0.666	0.400	0.109	0.097
Having healthcare professionals in family	0.0008	0.195	0.003	0.966
Living in the middle Taiwan	0.332	0.270	0.088	0.221
Living in the south Taiwan	-0.154	0.223	-0.052	0.489
Living in the east Taiwan	0.414	0.406	0.070	0.310
Have a full or part-time job	-0.511	0.203	-0.179	0.013*
Health Literacy	0.072	0.039	0.139	0.064
Health Status	0.056	0.035	0.135	0.072
F	2.407**			
R ²	11.0%			

B: unstandardized coefficient, SE: standard error, β : standardized coefficient

* p < 0.05, ** p < 0.01

^a Compared with those without a B.S. degree

Table 3. Types of the used medications reported by the participants (n = 226).

Types of medications	n (%)
Drugs for cardiovascular disease	96 (42.5)
Vitamins or health supplements	67 (29.6)
Cholesterol-lowering drugs	52 (23.0)
Diabetes drugs	45 (19.9)
Anticoagulants	40 (17.7)
Analgesics	39 (17.3)
Gastrointestinal medication	37 (16.4)
Sleeping aids	36 (15.9)
Chinese herbal medication	21 (9.3)
Non-prescription drugs	20 (8.8)
Mood stabilizers	19 (8.4)
Respiratory drugs	14 (6.2)
Antimicrobials	11 (4.9)
Eye drops	7 (3.1)
Urinary tract medication	6 (2.7)
Skin medication	4 (1.8)
Neurological drugs	4 (1.8)
Drugs for hepatitis	1 (0.4)

Note: The sum of percentages may exceed 100% as the question allowed participants to select multiple answers.

Table 4. Types of drug-related problems reported by the participants (n = 226).

Types of drug-related problems	n (%)
Allergic to medication	33 (14.6)
Duplicated medication	26 (11.5)
Storage problem	23 (10.2)
Drug-drug interactions	20 (8.8)
Confusion about how to use or where to apply	19 (8.4)
Dosage or frequency error	13 (5.8)
Drug-food interactions	11 (4.9)
Taking the wrong medication	9 (4.0)

Note: The sum of percentages may exceed 100% as the question allowed participants to select multiple answers.

Table 5. Types of medication information deemed the most important reported by the participants (n = 226).

Types of information	n (%)
Proper use and dosage	190 (84.1)
Therapeutic effects	188 (83.2)
Side effects and how to deal with them	165 (73.0)
Drug-drug interactions	111 (49.1)
Drug-food interactions	111 (49.1)
Proper storage	92 (40.7)
Medication duplication	74 (32.7)
Omission or duplicate dosing	69 (30.5)
Taking medication in case of dysphagia	33 (14.6)
Other (precise name of medication)	1 (0.4)

Note: The sum of percentages may not add up to 100% as the question was filled in if the participants had experienced a problem. Participants were allowed to select multiple items.

drug-related problem, 88.7% reported that the problem was not serious, while 4.0% were hospitalized as a result; 78% solved the problem by consulting with medical professionals, either a pharmacist (50.8%), a physician (37.1%), or a nurse (5.6%), indicating that the public finds pharmacists to be a reliable source of information. Approximately 83.9% of the participants indicated that the advice on how to cope with the problem provided by different types of medical personnel was consistent. As for who they would most likely consult should a similar problem arise in the future, the top responses were physicians (49.2%) and pharmacists (46.0%).

3.4. Perceptions of medical care received

About 95.7% of the participants felt that the medication information and assistance they received after medical treatment has been helpful regarding the proper use of their medication; among these, about 78.8% indicated that the relevant information was provided by a pharmacist. Around 70.8% of the participants indicated that while being discharged from the hospital or completing a visit to a clinic, a health professional checked and reviewed the prescribed medication and told them how to use it (81.1% of whom were a pharmacist). Among these participants, 92.5% found such assistance was helpful. As for the medication-related information that the participants felt to be most important, the five leading pieces of information were information on how to take the medication and the correct dosage (84.1%), its therapeutic effects (83.2%), side effects and how to deal with them (73.0%), drug-drug interactions (49.1%), and drug-food interactions (49.1%), as shown in Table 5.

About 27.9% of the participants reported they had confusion about how to take medication, and 23.9% felt out of control of their medications. This means that many patients need help from pharmacists regarding how to take their medication appropriately. In addition, 35.8% of the participants felt comfortable that drug treatment is determined by doctor alone, and 63.3% believed that patients should play a role in deciding which medications and strength are prescribed. This relatively high proportion of participants interested in shared decision-making on drug treatment may be related to the relatively young age and high educational background of the participants.

4. Discussion

This study identified that having a job is a risk factor associated with lower medication adherence; however, health literacy is not significantly correlated with medication adherence. Similar to prior research, health literacy is not directly associated with medication adherence (Bailey et al., 2014; Huang et al., 2018). Health literacy is reported as an important factor related to medication adherence; however, it could affect medication adherence via medication or moderation effects with other factors (e.g., self-efficacy, patient-provider communication, healthy coping skills)

relevant to medication adherence (Bailey et al., 2014). In addition, previous research has postulated that employment may be a contributing factor to a decreased medication adherence due to burdensome work schedules (Osterberg & Blaschke, 2005). Patients with chronic illnesses (e.g., mental disorder) may avoid taking medications during work time to avert social stigma from their colleagues (Kamaradova et al., 2016; Waite et al., 2008). As a result, using a medication-taking reminder and providing friendly working environment may encourage patients to take their medications as instructed.

In this study, nearly half of the participants had a university degree or above. While the relatively high level of education of the participants in the present study would have made it easier for them to accurately complete the questionnaire, 53.5% of them indicated that they had some difficulty understanding health education leaflets and drug package inserts, 42.9% indicated that they need help when reading such health-related materials (e.g., examination instructions and reports), and 30.5% had difficulty when filling in medical-related forms. All of these findings highlight a need for providing patients with readable information matched to their health literacy. Low health literacy is identified as a risk factor pertinent to medication non-adherence (Eassey et al., 2016), though not significant in our study, a large portion of participants in this study reported having difficulties understanding health education leaflets and drug package inserts. They need additional aid when reading such health-related materials and filling in medical-related forms. As such, using plain languages to improve patients' understanding of health information could facilitate their healthcare-related decision-making.

In this study, only 8.4% of the participants reported their full adherence to the medications as prescribed. Of the reasons of medication non-adherence, 41.2% of the participants reported either taking less than the prescribed amount or discontinuing the medication altogether, 36.7% reported forgetting to take their medication when traveling or going out, and 24.3% forgot to take their medication on the previous day or the last time they were supposed to, which shows that patients can easily fail to take the medication as prescribed for various reasons. This highlights the need for pharmacists to ensure that patients understand the importance of taking their medication for the disease management. In addition, integrating reminders for medication-taking and simplifying treatment regimen are two effective strategies to improve medication adherence (Kini & Ho, 2018).

The most common problem encountered by the participants was the confusion resulting from getting a prescription refilled with a medication with the same amount of the same ingredients, but produced by a different manufacturer. The second common problem was being unable to fill a prescription because the required medication was out of stock. In fact, these two issues are closely interrelated, since shortages do occur on occasion,

necessitating the use of a substitute. However, if the doctor gives patients the prescription without informing that the medication prescribed before will be substituted, patients may get confused when they find that the medication received has a different name than before. As the *Regulations Governing the National Health Insurance Medical Care* in Taiwan states (Ministry of Justice, 2020), "Where a physician does not specify that the prescribed drug or medical device cannot be substituted in a prescription, a pharmacist (assistant pharmacist) may replace the drug with a drug of another brand with the same ingredients, dosage, and contents at the same or lower price, or replace the medical device with specialty material of another brand of the same functional category, and inform the beneficiary." Therefore, when a patient with a chronic condition goes to a pharmacy to have his/her prescription filled for the second or third time, if the prescription does not specifically state that substitutes are not acceptable, then in case of a shortage it is permissible for the pharmacist to substitute a drug produced by another manufacturer, as long as the ingredients, form, and dosage are identical. When such a substitution is done, the pharmacist is required to clearly indicate the name of the substitute on the prescription or medication bag, and to clearly inform the patient, so as to avoid any possible confusion.

Overall, the findings from this study indicate that pharmacists are encouraged to stand at the front-line to proactively engage in patient education. Most of the participants implied that the information and assistance from pharmacist helped them use their medication correctly. In addition, a majority of participants indicated that while being discharged from the hospital or completing a visit to a clinic, pharmacists checked and reviewed the prescribed medication with them to assure if the medication was required and told them how to use it, and such assistance was helpful for their medication-taking. However, some participants reported that time constraints precluded patients and pharmacists from engaging in a full understanding of medication-related education. Hence, refinement of the workflow and offering more patient-pharmacist conversations would benefit patients' comprehension of medication-related information.

Findings from this study should be interpreted cautiously given its limitations. We used a convenience sampling to recruit participants, and they do not represent all Taiwanese population. As such, the generalizability may be limited. In addition, medication adherence may vary due to different disease states, complex regimens, and other factors not captured in this study. Future studies need to take these factors into consideration when exploring the mechanism of medication non-adherence or implementing interventions to improve medication adherence.

5. Conclusion

This study identifies salient risk factors of medication adherence and points out areas where pharmacists can

provide services that meet patients' expectation. Pharmacists are one of the key healthcare professionals who provide credible information of medication use and safeguard patients' medication safety. Performing a needs assessment from patients' perspective could provide pharmacists with more insights in tailoring pharmacy services to address critical factors related to medication safety.

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Appendix: The Medication Use among the General Public Questionnaire

Prior to filling out the questionnaire, I have read the Participant Information statement and agree to participate in the study.

(Please tick the box above before proceeding to the questionnaire.)

Medication Use among the General Public Questionnaire

■ Please fill out the questionnaire from the perspective of the user (or patient) of medications.

■ Respondents can be users of medications or caregivers (e.g., the family member or caretaker of patients).

■ Background information

1. What is your relationship with the user of medications (or patient)?

Myself

Caregiver (You are: Family member Non family member

Other _____)

2. What is your gender?

Female Male

3. What is your highest level of education?

Secondary school or below

High school graduate or equivalency

Associate's degree or a 2-year college degree

Bachelor's degree or a 4-year college degree

Master's degree

Advanced degree such as a Ph.D.

Please answer the following questions based on the experience of medication use from the user or the patient. If you are a caregiver, please answer the questions based on the experience of medication use of the patient whom you take care of.

Part 1: Sociodemographic background of the user of medications or patient

1. What is your age (in year)? _____ years old
2. What city do you live in? _____
3. Do you have National Health Insurance now? Yes No
4. Is there any healthcare professional in your family? Yes No
5. What is your current living arrangement?
 - Live alone
 - Live with others (multiple choices are accepted)
 - (Spouse/Partner Parents Daughter/Son
 - Other relative Friend Caretaker)
6. What is your employment status?
 - Full-time
 - Part-time
 - Temporary jobs
 - On temporary leave
 - In training/Between jobs
 - Retired
 - No longer working
 - Other _____

If you are the user of medications, please skip to question 9 and proceed to the following question.

7. What is your gender?

- Male Female

8. What is your highest education level?

- Secondary school or below
 High school graduate or equivalency
 Associate's degree or a 2-year college degree
 Bachelor's degree or a 4-year college degree
 Master's degree
 Advanced degree such as a Ph.D.

Part 2: Health Status

In the following section, we would like to ask you about your perception of health status. By placing a tick in one box in each statement, please indicate which options best describe your own health state within the last 3 days.

	No problems	Slight problems	Moderate problems	Severe problems	Can not perform
9. I have no problems in walking around	<input type="checkbox"/>				
10. I have no problems with washing or dressing myself	<input type="checkbox"/>				
11. I have no problems with performing my usual activities (e.g. work, study, housework, family or leisure activities)	<input type="checkbox"/>				

	No	Mild	Moderate	Severe	Extremely severe
12. I feel pain or discomfort	<input type="checkbox"/>				
13. I feel anxious or depressed	<input type="checkbox"/>				

14. To help people say how good or bad a health state is, we have drawn a line (rather like a thermometer) on which the best state you can imagine is marked 100 and the worst state you can imagine is marked 0.

We would like you to indicate on this scale how good or bad your own health is within the last 3 days. Please do this by drawing a line from the box below to whichever point on the scale indicates how good or bad your health state is within the last 3 days.

Your own health state
within the last 3 days.

Best
imaginable
health state

100



0

Worst
imaginable
health

Part 3: Health Literacy

In the following section, we would like to ask you about your experience of using health information. By placing a tick in one box in each statement, please indicate which options best describe your experience of using health information.

	Never	Occasionally	Sometimes	Often	Always
15. How often do you have problems learning about your medical condition because of difficulty understanding written information?	<input type="checkbox"/>				
16. How often do you have someone help you read hospital materials?"	<input type="checkbox"/>				
17. How confident are you filling out medical forms by yourself?	<input type="checkbox"/>				

Part 4: Medication Adherence

Individuals have identified several issues regarding their medication-taking behavior and we are interested in your experience. There is no right or wrong answer. Please answer each question based on your personal experience with your prescription medications.

	Yes	No
18. Do you sometimes forget to take your pills?	<input type="checkbox"/>	<input type="checkbox"/>
19. People sometimes miss taking their medications for reasons other than forgetting. Thinking over the past two weeks, were there any days when you did not take your medications?	<input type="checkbox"/>	<input type="checkbox"/>
20. Have you ever cut back or stopped taking your medication without telling your doctor because you felt worse when you took it?	<input type="checkbox"/>	<input type="checkbox"/>
21. When you travel or leave home, do you sometimes forget to bring along your medication?	<input type="checkbox"/>	<input type="checkbox"/>
22. Did you take all your medication yesterday?	<input type="checkbox"/>	<input type="checkbox"/>
23. Taking medication every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan?	<input type="checkbox"/>	<input type="checkbox"/>
24. Do you ever feel it difficult in remembering the time to take your medications?	<input type="checkbox"/>	<input type="checkbox"/>

Part 5: Medical Care Status

25. Which of the following health services do you currently access on a regular basis (tick as many as apply)?
- Hospital (_____) (in name)
 - Clinic
 - Chinese medicine clinic
 - Community pharmacy
 - Other _____
26. How many times have you accessed the above health services in the last 3 months?
- 0-5 times 6-10 times 11-15 times 16-20 times more than 20 times
27. How many doctors routinely write prescriptions for you? _____ (in numbers)
28. Do you go to the same pharmacy for all your prescription and over-the-counter medications?
- Yes
 - No (How many other pharmacies do you routinely go to? _____ (in numbers))
29. Which types of medications are you currently taking? (Please tick as many of the following categories that apply). Medications for:
- Heart or blood pressure (including water pills)
 - Blood (such as aspirin or warfarin)
 - Cholesterol
 - Diabetes (such as insulin or tablets)
 - Stomach or intestines (such as medications for heart burn)
 - Pain (such as medications for arthritis or back pain)
 - Helping you sleep (such as sleeping tablets)
 - Mood stabilizer (such as antidepressants)
 - Infection (such as antibiotics)
 - Lung problems (such as asthma or COPD)
 - Vitamins and mineral supplements (such as glucosamine, fish oil, calcium supplements)
 - Herbal medicines (from Chinese medicine hospital, clinic, or pharmacy)
 - Over-the-counter medications (such as cold medications)
 - Others (e.g. medications for mental illness, dementia, cancer) – provide details in the box below

30. How many regular medications are you taking now? (including prescription medications, over-the-counter medications, Chinese medicines, and vitamins/supplements)? _____ (in numbers)
31. Do you have a family member or friend who helps you with taking your medications?
 Yes No
32. If you answered 'yes' to the above question, who helps you? (please tick any of the following which apply)
 Spouse/Partner
 Parents
 Daughter/Son
 Other relative
 Friend
 Caretaker
33. Which types of medications that cost you the most?
 Copayment of medications from NHI-contracted healthcare facilities
 Out-of-pockets expenses of medications from healthcare facilities
 Vitamin and mineral supplement
 Herbal medicines (from Chinese medicine hospital, clinic, or pharmacy)
 Over-the-counter medications
 Other _____

Part 6: Medication Safety

34. Which of the following medication-related problems did you experience? (tick as many as apply)

(1) After discharge from hospital or outpatient visit, you found that:

- Medications missing from your usual medication list
- Confusion about the given medication that you did not use before
- Being given medications that have the same strength but different brand.
- Changes in your medications that you were not aware of

(2) Problems related to the refill of medications:

- Did not know where to refill your medications
- Shortage of medications

(3) Problems related to medication use:

- Using the wrong medication
- Duplication of the use of similar medications
- Taking the medication via wrong routes
- Unwanted effects from taking the medication with a wrong dosage or frequency
- Drug allergy
- Unwanted effects from co-administering the medication with food
- Unwanted effects from co-administering two or more medications
- Problems related to inappropriate medication storage

(4) Other problems, please describe briefly:

(5) Experienced no problems. (If so, please skip Question 35-41, and continue this survey from Question 42.)

35. What did you do to try to resolve the above problems?

- Ask healthcare professions (Doctor Pharmacist Nurse)
- Ask your family and friends
- Search the internet
- Continue taking medications
- Stop taking medications immediately
- Other _____

36. How serious do you think the medication-related problem was?

- Mild Moderate Severe

37. Which healthcare professionals were involved in the problem(s)?
- Hospital (Doctor Nurse Pharmacist)
 - Clinic (Doctor Nurse Pharmacist)
 - Community pharmacist
 - Other _____
38. Who resolved the problem(s)?
- Hospital (Doctor Nurse Pharmacist)
 - Clinic (Doctor Nurse Pharmacist)
 - Community pharmacist
 - Other _____
39. Were you hospitalized due to the medication-related problems? Yes No
40. To what extent was the advice you got from different people about your medications (including healthcare professionals) conflicting?
- Not conflicting at all
 - Partially conflicting
 - Mostly conflicting
 - Very conflicting
 - I did not get any advice
41. Who would you ask first if you have the same problem in the future?
- Hospital doctor
 - Hospital nurse
 - Hospital pharmacist
 - Clinic doctor
 - Clinic nurse
 - Clinic pharmacist
 - Community pharmacist
 - Other healthcare professionals
 - Other _____

Part 7: Medical Care

Medication assistance and information

42. Did you receive any assistance/information regarding your medications when you were discharged home from hospital or outpatient visit?
- Yes No (If no, please skip to Question 47)
43. If you answered 'yes' to the question above, who provided you with this assistance/information? (tick as many as apply)
- Doctor Nurse Pharmacist Other _____
44. To what extent was the assistance/information you got helpful?
- Not helpful at all Not helpful Helpful Somewhat helpful
 Very helpful
45. Were you provided with a written list describing your medications?
- Yes No
46. Were you provided with any printed information regarding your medications when you were discharged home from hospital or outpatient visit?
- Yes No
47. In your view, which of the following medication information is important for medication use?
- Therapeutic effect or indication of the medication
 Correct administration and dosage
 Coping strategies of missing any doses or taking more doses than prescribed
 Adverse drug reactions and their coping strategies
 Unwanted effects from co-administering the medication with food
 Review of duplicate medications
 Unwanted effects from co-administering two or more medications
 Storage of the medication
 Coping strategies if it is hard to swallow the whole pill/tablet
 Other _____
48. What, if anything, could be improved about the help/information you received from health professionals about your medications when you were discharged home from hospital or outpatient visit?

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Medication discussion

49. Were you involved in any discussions about your medication when seeing a doctor?
 Yes No (If no, please skip to Question 52)
50. To what extent did you feel you played an active role in any decision-making about your medications?
 Played no role at all in decision-making
 Only played a small role in decision-making
 Neutral
 Active role in decision-making
 Very active role in decision-making
51. When your health professionals were discussing your medications with you, were you provided with any administration aid packages of your medications to help your decision-making about taking your medications?
 Yes No

Medication review

52. After you were discharged home from hospital or outpatient visit, were your medications reviewed with you by a health professional?
 Yes No (If no, please skip to Question 57)
53. If you answered 'yes' to the above question, which health professional(s) reviewed your medications? (tick as many as apply)
 Doctor Nurse Pharmacist Other _____
54. How helpful did you feel about the review?
 Not helpful at all
 Not very helpful
 Neutral
 Somewhat helpful
 Very helpful

55. To what extent did you feel you played an active role in the discussions during the review?
- Played no role at all
 - Only played a small role
 - General
 - Active role
 - Very active role
56. Overall, were your medication-related questions answered during the review?
- Not answered at all
 - Mostly not answered
 - Half answered
 - Mostly answered
 - Answered all the questions

Medication control

57. How confusing did you find the instructions for taking your medications?
- Not confusing at all
 - Not really confusing
 - Neutral
 - Somewhat confusing
 - Very confusing
58. To what extent did you feel in control of your medications?
- Not in control at all
 - Not really in control
 - Neutral
 - Somewhat in control
 - Totally in control
59. What are your opinions about the role of the patient in making medication-related decisions?
- Ask the doctor for prescription after the patients decide the medication by themselves
 - Let the doctor decide alone
 - Make decisions after discussing with the doctor
 - Other _____

60. How do you feel about patients taking a more active role in reviewing and verifying their own medications after discharged home from hospital or outpatient visit?
- Strongly disagree
 - Disagree
 - Neutral
 - Agree
 - Strongly agree
61. To what extent do you trust that the decisions made by your health professionals about your medications are correct?
- Do not trust at all
 - Not trust
 - Neutral
 - Trust partially
 - Trust completely
62. How willing are you to participate in the decisions your doctors make about your medications?
- Not willing at all
 - Not willing
 - Neutral
 - Somewhat willing
 - Very willing
63. Which healthcare professional(s) provides you the majority of medication information? (tick as many as apply)
- Hospital doctor
 - Hospital nurse
 - Hospital pharmacist
 - Clinic doctor
 - Clinic nurse
 - Clinic pharmacist
 - Community pharmacist
 - Other healthcare professionals
 - Other _____

64. Which healthcare professional that provides medication information do you trust most?

- Hospital doctor
- Hospital nurse
- Hospital pharmacist
- Clinic doctor
- Clinic nurse
- Clinic pharmacist
- Community pharmacist
- Other healthcare professionals
- Other _____

Thank you for completing the questionnaire.

THIS IS THE END OF THE SURVEY