ORIGINAL ARTICLE

A comparison of medication adherence between subsidized and self-paying patients in Malaysia

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Abstract

Background: Limited efforts have been made to evaluate medication adherence among subsidized and self-paying patients.

Objective: To investigate medication adherence among patients with and without medication subsidies and to identify factors that may influence patients' adherence to medication.

Setting: Government healthcare institutions in Kuala Lumpur, Selangor, and Negeri Sembilan and private healthcare institutions in Selangor and Negeri Sembilan, Malaysia.

Methods: This cross-sectional study sampled patients with and without medication subsidies (self-paying patients). Only one of the patient's medications was re-packed into Medication Event Monitoring Systems (MEMS) bottles, which were returned after four weeks. Adherence was defined as the dose regimen being executed as prescribed on 80% or more of the days. The factors that may influence patients' adherence were modelled using binary logistic regression.

Main outcome measure: Percentage of medication adherence.

Results: A total of 97 patients, 50 subsidized and 47 self-paying, were included in the study. Medication adherence was observed in 50% of the subsidized patients and 63.8% of the self-paying patients (χ^2=1.887, df=1, p=0.219). None of the evaluated variables had a significant influence on patients' medication adherence, with the exception of attending drug counselling. Patients who attended drug counselling were found to be 3.3 times more likely to adhere to medication than those who did not (adjusted odds ratio of 3.29, 95% CI was 1.42 to 7.62, p = 0.006).

Conclusion: There is no significant difference in terms of medication adherence between subsidized and self-paying patients. Future studies may wish to consider evaluating modifiable risk factors in the examination of non-adherence among subsidized and self-paying patients in Malaysia.

Introduction

Patients with chronic diseases, such as diabetes, stroke and cardiovascular diseases, usually require long-term use of medication to control their conditions. Therefore, it is important that patients take their medication as advised since failure to adhere to the prescribed medication could lead to poor clinical outcomes, increased healthcare costs, increased hospital stays, and an increased economic burden on the country's healthcare system.[1-3] Despite the general knowledge that adhering to prescribed medications is important, medication non-adherence remains a major problem worldwide. According to the World Health Organization's (WHO's) 2003 report, 50% of patients with chronic diseases do not adhere to their prescribed treatment. This problem was reported to exist in both developed and developing countries. For example, in the United States of America (USA), approximately half of the 3.2 billion annual prescriptions dispensed were not used as prescribed.[4] Similarly, in Malaysia, approximately 46% and 56% of patients with hypertension were non-adherent in terms of their medications.[2,5]

Adherence to long-term therapy is defined by the WHO as "the extent to which a person's behavior taking medication, following a diet, and/or executing lifestyle changes corresponds with agreed recommendations from a healthcare provider".[6] Patients' adherence to medication can be influence by many factors. These include health-system-related, patient-related, condition-related, socioeconomic-related, and therapy-related factors.[6] One important factor that may influence patients' adherence to medication is medication cost. A previous study on medication adherence using the Health Belief Model reported that an increase in medication cost may decrease

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patients' adherence to medication.[7] In the study, adherence to diabetes medications was found to be influenced predominantly by the costs of or barriers to the diabetes management regimen.[7] In addition, higher out-of-pocket spending (self-paying) and medication co-payments were also reported to increase the risk of stopping or becoming non-adherent to medication.[8]

Another previous systematic review of patients with diabetes mellitus suggested reducing an inpatient's cost share to increase medication adherence.[9] This is in view of the fact that high patient copayments or out-of-pocket expenditures for medication had a significant association with medication nonadherence.[10] Nevertheless, studies examining patient adherence to fully subsidized medications reported variable findings. In a study by Sears et al., medication adherence was reported to be low (34%) among veteran patients with medication subsidies for treatment of overactive bladder.[11] Meanwhile, in a study by Batavia et al., subsidized patients with Human Immunodeficiency Virus (HIV) in India were found to have significantly higher adequate adherence rate (84.6%) than self-paying patient groups who need to pay 50%, 75% and 100% of their medication costs (71.6%, 72.3%, and 79.2% respectively).[12]

In Malaysia, the major provider of healthcare services, the public health care system, is subsidized heavily by the government.[13] Nevertheless, patients' adherence to medication is worrisomely low. Based on the Fees (Medical) Order of 1976, Malaysian public primary care services are provided nearly free of charge, and patients can received medical care and medication at a minimal cost of RM1 per visit.[13] However, a study by Ramli et al. found that only 53.3% of hypertensive patients receiving treatment at public primary healthcare clinics were adherent to their medication.[2] In addition, a study by Hassali et al. reported a high return rate for unused medication at a government hospital in Malaysia. In their study, the calculated cost of returned unused medication was about RM42.35/patient. If this cost is postulated across Malaysia, it could result in the government losing a million dollars per year.[14] One of the possible reasons for the returned unused medications is medication non-adherence.[14]

Although medication adherence among patients

with medication subsidies was evaluated in previous studies, few have compared it with self-paying patients. In addition, to our knowledge, no study has yet evaluated and compared the potential factors that may influence subsidized and self-paying patients' adherence to medication.

Aim of the study

This study aims to compare the medication adherence of subsidized and non-subsidized patients (i.e., self-paying patients) and to identify factors that may influence patient behavior in terms of medication adherence.

Ethics approval

Ethical approval for this study was obtained from the Research Ethics Committee of Universiti Kebangsaan, Malaysia (UKM 1.5.3.5/244/ NF-056-14) and the Medical Research and Ethics Committee of the Ministry of Health, Malaysia (NMRR-14-1255-22473).

Methods

This is a cross sectional, observational study of the medication adherence of patients with and without medication subsidies. Patients were clustered into two groups based on their medication payment schemes and sampled using a convenience sampling technique. Patients who received their health consultation at public hospitals or clinics and were not required to buy their medication on their own were classified as subsidized patients. Private patients who paid medication costs themselves and/or for whom medication costs were not covered by insurance or an employer benefit scheme were classified as self-paying patients. Subsidized patients were sampled from two governments hospitals located in Kuala Lumpur and a health clinic located in a rural area in Malaysia. Meanwhile, self-paying patients were sampled from one private hospital, one private clinic, and a community pharmacy in Selangor, Malaysia.

Using convenience sampling, patients who attended those facilities as out-patients were approached in the pharmacy waiting area and told about the study. Since respondents were required to use a Medication Event Monitoring Systems (MEMS) bottle, they were also told about the function of the MEMS bottle. In particular, respondents were told that the bottle cap recorded and stored patients' dosing events

in terms of the actual times that the medication container was opened and closed. Only one of the respondent's chronic illness medications, the one deemed to be the most expensive medication, was repacked into the MEMs bottle. The most expensive medication for subsidized patients was determined by reviewing the medication prices printed on the patients' medication labels. For self-paying patients, the most expensive medication was determined based on patient's information and medication bills.

Respondents were invited to participate if they agreed to use the MEMS bottle and fulfilled the study inclusion criteria, which were that they were an adult aged 18 years and above, were diagnosed with at least one chronic disease, used at least three types of long-term medication, and were on the medication therapy for at least 6 months. Patients were excluded from the study if they were terminally ill, lived in assisted living facilities, had difficulties in opening a MEMS cap (such as patients with rheumatoid arthritis), using pillbox as a medium for organizing their medication, and/or had cognitive impairment, such as dementia or Alzheimer's disease. Patients who agreed to participate were asked to sign an informed consent form and fill in the survey. Data collection was done between December 2014 and October 2015. Using the reported adherence rates for subsidized and self-paying patients by Ramli et al.[2] and Batavia et al.[12], respectively, as reference, the relative sample size required to detect a difference between two proportions (level of significance (α) of 0.05, power of 80%, with proportions of adherence in subsidized and self-paying patients of 53% and 80%, respectively) was 45 in each group.[15]

Based on common reported factors for medication non-adherence, the following demographic data and characteristics were collected from the participants during the first meeting: age, gender, monthly income, educational background, marital status, patient's location (rural or urban), experience in attending drug counseling, frequency of the medication selected to be stored in the MEMS bottle, number of health problems, and number of medications prescribed. The median household income in all states in Malaysia for 2015 was RM3000.[16] Therefore, the following categories were established for patients' household incomes: 1) > RM3001 for above the countries' median household income, 2) < RM1000 for poor households, and 3) RM1001 to RM3000 for below the median

household income.[17] The rurality of the facility participant attended was determined following the definition of the Department of Statistics, Malaysia, in which rural refers to a settlement with a population of less than 10,000 people. The public clinic for subsidized patients was chosen purposely, as it located in the Felda community area, which is known to be rural.

To ensure that respondents knew what drug counselling was, the respondents were provided with the explanation that it refers to a one-to-one session with a pharmacist in which the pharmacist provided information, discussed the patient's concerns, and answered the patient's questions related to their medications. With the participant's agreement, their medications were reviewed and only one medication was re-packed into a MEMS bottle for each participant. Respondents were asked to take the medication in the MEMS bottle as instructed by their healthcare provider and to open the MEMS bottle only when they actually took their medication. The MEMS bottles were collected by the researchers at the participants' homes after four weeks. The data that were stored on the MEMS cap were then downloaded to a computer.[18] Medication adherence was calculated as the percentage of days in which the dose regimen was executed as prescribed (number of days of bottle openings in accordance to the number of doses prescribed). Referring to the previously cited definition, the current study used 80% as the cut-off point for medication adherence.[19-24]

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) Version 20. Descriptive data were presented as means and standard deviations where appropriate. Medication adherence was modeled separately for subsidized and self-paying patients using binary logistic regression with both the stepwise and backward elimination approaches. Prior to the final modeling, a univariate analysis was performed to determine which variables would be included in the final analysis. Only variables with p-values of <0.25 were included in the final model.[25] In the final model, only those variables with a p-value <0.05 were determined to have a significant influence on medication adherence behavior.

Results

A total of 250 patients were approach, and 112 patients agreed to participate in the study. However, upon completion of the

study, only 105 participants (92.9%) returned the MEMS bottles. Patients that did not return the MEMS bottle could not be reached (n=3) or claimed to have lost the bottle (n=4). Of the 105 returned MEMS bottles, 8 patients' MEMS data were excluded as only one or two readings of the bottle being opened were available. Upon confirming with the patients, they admitted that the medication were taken out from the MEMS bottle and stored it in another container. Thus, a total 97 (86.6%) patients provided data that were suitable for data analysis. Of this, 50 patients were from the subsidized group and 47 were from the self-paying group. The demographic characteristics of the participants are presented in **Table 1**.

Table 1: Demographic characteristics of respondents (n=97)

Demographic characteristics	Total or Mean (SD)	n (%) / Mean (SD)		p-value
		Subsidized (n=50)	Self-pay (n=47)	
Age	55.26 (10.76)	52.98 (10.8)	57.68% (10.3)	0.168
Gender				0.265
Male	48 (49.5%)	22 (44%)	26 (55.3%)	
Female	49 (50.5%)	28 (56%)	21 (44.7%)	
Monthly income				0.001
<RM1000	26 (26.8%)	10 (20%)	16 (34%)	
RM1001-RM3000	39 (40.2%)	30 (60%)	9 (19.1%)	
>RM3001	32 (23.0%)	10 (20%)	22 (46.8%)	
Educational Background				0.171
Primary school	27 (27.8%)	17 (34%)	10 (21.3%)	
Secondary school	39 (40.2%)	21 (42%)	18 (38.3%)	
College/ University	31 (32%)	12 (24%)	19 (40.4%)	
Marital status				0.191
Single	5 (5.2%)	4 (8%)	1 (2.1%)	
Married	92 (94.8%)	46 (92%)	46 (97.9%)	
Patient's location				<0.001
Urban	74 (76.3%)	26 (54%)	47 (100%)	
Rural	23 (23.7%)	23 (46%)	0 (0%)	
Attended drug counseling				0.074
Yes	42 (43.3%)	24 (48%)	31 (66%)	
No	55 (56.7%)	26 (52%)	16 (34%)	
Frequency of medication				0.333
Once a day	44 (88%)	38 (80.9%)	82 (84.5%)	
Twice a day	6 (12%)	9 (19.1%)	15 (15.5%)	
Number of health problems	2.68(0.93)	2.72 (0.93)	2.64 (0.94)	0.678
Number of medications prescribed	4.80(1.90)	5.48 (1.91)	4.09 (1.65)	<0.001

The mean and standard deviation (SD) of the patients' ages is 55.26 (10.76). There were no significant differences in term of patients' demographic information and characteristics between the subsidized and self-paying groups except for monthly income and the number of medications prescribed (p <0.05 for both). More self-paying participants had a household income of ≥ RM3001 than the subsidized participants (p =0.001). The number of medications received by respondents was between three and 11, with subsidized patients receiving more medications than self-paying patients (mean number of medications 5.48 ± 1.91 and 4.09 ± 1.65, respectively) (p < 0.001).

Common health problems experienced by respondents in this study were diabetes, ischemic heart disease, dyslipidemia, hypertension, and stroke.

The overall mean adherence rate was 78.42 ± 23.34. When analyzed separately, the mean adherence rate of subsidized patients was 74.1 ± 27.05, and that of self-paying patients was 83.02 ± 17.77 (t (95) = 1.05, p = 0.059). A total of 25 subsidized (50%) and 30 self-paying (63.8%) patients were adherent to their medications (χ^2 = 1.887, df = 1, p = 0.219). Demographic factors for medication adherence and non-adherence that are commonly reported were modeled. Three variables: gender, experience attending drug counseling, and payment scheme (subsidized and self-paying) were included in the final model of medication adherence, but only attending drug counseling had a significant influence on adherence to medication (AOR 3.3, 95% CI of 1.42 to 7.62, p = 0.006) (**Table 2**). Participants who attended drug counseling were 3.3 times more likely to be adherent to their medication than participants who did not.

Table 2: Medication adherence model for subsidized and self-paying patients (n=97)

Variables	Univariate analysis				Multivariate analysis			
	Crude OR	95% CI	Wald's χ^2 (df)	p-value	Adjusted OR	95% CI	Wald's χ^2 (df)	p-value
Age	1.00	0.97-1.04	0.01(1)	0.91	-	-	-	-
Gender								
Male	1.90	0.84-4.29	2.38(1)	**0.12**	-	-	-	NS
Female	1.00							
Monthly income								
<RM1000	1.29	0.48-3.50	0.26(1)	0.61	-	-	-	-
RM1001-RM3000	1.78	0.58-5.46	1.01(1)	0.32	-	-	-	-
>RM3001	1.00							
Educational Background								
Primary	1.55	0.57-4.16	0.75(1)	0.39	-	-	-	-
Secondary	1.71	0.60-4.85	1.00(1)	0.32	-	-	-	-
College/university	1.00							
Marital status								
Single	1.15	0.18-7.23	0.02(1)	0.88	-	-	-	-
Married	1.00							
Attend drug counseling								
Yes	3.29	1.42-7.62	7.70(1)	**0.006**	3.29	1.42-7.62	7.70(1)	**0.006**
No	1.00							
Frequency of medication								
Once daily	1.17	0.38-3.60	0.08(1)	0.78	-	-	-	-
Twice a day	1.00							
Payment scheme								
Self-pay	1.77	0.78-3.98	1.87(1)	**0.17**	-	-	-	NS
Subsidized	1.00							
Number of health problem	0.98	0.64-1.51	0.009(1)	0.93	-	-	-	-
Number of medications	0.95	0.77-1.18	0.21(1)	0.65	-	-	-	-

NS: Non-significant

Discussion

The current study evaluated the medication adherence among subsidized and self-paying patients. In general, the medication adherence among patients with chronic diseases included in the current study was poor. Only 50% of subsidized patients and 63.8% of self-paying patients had medication adherence scores of 80% and above. Even when the participants received their medication at minimal cost or for free, the non-adherence rate was still found to be unsatisfactory. A similar finding was also reported in the study by Bailey et al.

in South Texas among underserved diabetes patients. In their study, patients who received medication at $5, $9.99, or free-of-charge had a suboptimal medication adherence rate of 44.1%.[26] In a different study among veteran patients in Philadelphia, USA, only 60.8% of patients who received medication subsidies (exempted from co-payment scheme) were adherent to their medications.[27]

Although, in the current study, self-paying patients had a better medication adherence rate than subsidized patients, the different was not significant. This finding contradicts the results from the Batavia et al. study conducted among HIV patients in India. They reported a significant difference in medication adherence between full medication subsidies and self-paying patients. The study, which assigned the payment rate according to patients' socioeconomic backgrounds, reported adherence rates of 84.6%, 71.6%, 72.3%, and 79.2% for patients who received medication free of charge, paid 50%, paid 75%, and paid 100% of the medication cost, respectively.[12] Adherence to medication was observed to be the highest among the underserved patients who could not afford to pay for their medication, i.e., free medication was found to promote a higher rate of adequate adherence. Nevertheless, among the self-paying patients, those with a higher payment rate had a higher percentage of adherence than patients who paid less. Batavia et al. perceived that, in certain cases, adherence may be improved or reduced when patients have constraints in terms of buying or obtaining their medication.[12] Similar findings were also reported by Park et al., a study that evaluated medication adherence among patients with diabetes. In their study, patients in private clinics with low incomes who received medical aid for health security had higher medication adherence than those with moderate and high incomes (p = 0.044).[28]

In the current study, the difference in medication adherence between subsidized and self-paying patients not being significant may be due to the uniqueness of the public healthcare system in Malaysia. In Malaysia, public healthcare is provided at minimal costs or free-of-charge to all Malaysian regardless of their socioeconomic background or income. Patients who make a regular visit to a public primary health clinic or hospital out-patient clinic are required to pay a minimum payment of RM1 to RM5 per visit. Up to 95% of the services provided at public healthcare institutions, including consultations, lab procedures, and medications, are provided at minimal cost or free-of-charge. Since patients may not be constrained to obtain their treatment and medications at public healthcare institutions in Malaysia, the perceived value of this service may be different from the previous reported studies. However, this may need to be investigated further in a future study.

In our attempt to investigate which patients' demographics and characteristics may influence medication adherence between subsidized and self-paying patients, only attending drug counseling by a pharmacist had a significant influence on medication adherence behavior. In a similar fashion, many studies have reported the significant influence of drug counseling service on improvements in patients' adherence to their medication.[29] Patients may become more adhere to their medication following drug counseling as they have gained more knowledge and understanding of the reasons for taking the medication and how to take it. During the session, a pharmacist may address the importance of taking the medication, help the patient to fit the medication into their daily routine, and overcome perceived barriers to medication adherence.[30]

Nevertheless, other demographic factors, such as age, gender, race, educational level, and marital status, did not have a significant influence on medication adherence since they may not be truly independent factors affecting adherence.[31] This is because demographic factors relate to socioeconomic and psychological backgrounds, as well as variations in culture.[31] In addition, predictors of medication adherence that are cited frequently, such as age, gender, ethnicity, income, and educational status, are usually inconsistent due to variations in the sample population and study design.[31] Consequently, studies have begun to explore more modifiable factors which may influence adherence, such as health beliefs or perceived benefits of medication.[32] Hence, despite this study exploring only patients' demographic factors, future studies may wish to consider exploring and comparing modifiable factors for medication adherence among subsidized and self-paying patients.

This study was subject to a few limitations. Firstly, medication adherence was measured with the assumption that patients took their medication when the MEMS caps were opened. Secondly, since patients were conveniently

sampled from hospitals, clinics, and a dispensary area, the study may have included patients who were more motivated to participate in the study and/or take care of their health. Thirdly, the results of the study may apply only to patients who can afford to buy or obtain their medication in a healthcare setting. The researchers predict that the result may be different if the study had included patients who did not return for (in the case of subsidized patients) or buy (in the case of self-paying patients) their medication due to financial constraints. However, such a sample may be difficult to obtain since, in the current system, patients who cannot afford to pay for their medication may have their health consultation and medication fully subsidized. Finally, no self-paying patients were sampled from a rural area as there was no private healthcare institution available in a rural setting. Due to this fact, generalizing the study findings to self-paying patients in rural areas would not be appropriate.

Conclusion

In conclusion, there is no significant difference in term of medication adherence between the subsidized and self-paying patients included in this study. Only attending drug counseling predicted the medication adherence of patients. More studies are required to understand the reasons for non-adherence among subsidized and self-paying patients. Future studies may wish to consider exploring modifiable factors that may influence patients' adherence to medication, such as patients' perceptions and beliefs concerning the value of their medications.

Conflicts of interest

The authors report no conflicts of interest in this work.

How does this paper make a difference to general practice?

- The medication adherence rate among subsidized and self-paying patients in this study is still unsatisfactory.
- The only variable considered in this study which influences patients' adherence to medication is attending drug counseling.
- Exploring the potentials reasons for medication adherence and non-adherence among subsidized and self-paying patients may help in the understanding of the issues facing by the patients when attempting to adhere to a prescribed treatment.
- Future studies may wish to explore the reasons for medication adherence and non-adherence, such as beliefs concerning and the perceived value of the medications among subsidized and self-paying patients in Malaysia.

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