

# Physician-patient interaction satisfaction and its influence on medication adherence and type-2 diabetic control in a primary care setting

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## ABSTRACT

**Introduction:** Medication adherence has been found to be an important determinant in achieving glycaemic control in Type 2 Diabetes (T2DM) patients. In other patient populations, physician-patient interaction satisfaction was found to influence medication adherence. It is then important to identify if this is also a factor amongst T2DM patients on insulin as poor adherence was associated with increased all-cause mortality.

**Methods:** This was a cross sectional study involving 197 T2DM patients on insulin from two government primary health clinics in Gombak. Physician-patient interaction satisfaction was assessed using *Skala Kepuasan Interaksi Perubatan* (SKIP-11) consisting of 3 subdomains (Distress Relief, Rapport and Interaction Outcome). Medication adherence level was measured using a single item self-report question. Data analysis for descriptive, inferential and multivariate analysis statistics were performed.

**Results:** The mean age of the study participants was 57.12 (SD: 9.27). Majority were Malay, female, unemployed with mean BMI of 27.5. Majority reported full adherence (62.9%). High scores in the Interaction Outcome subdomain was associated with better adherence. Factors associated with high scores in this subdomain included patient education level, number of oral hypoglycaemic agent and type of insulin regime taken. This study also found that high scores in the Interaction Outcome domain is associated with lower HbA1c ( $p < 0.05$ ).

**Conclusion:** Physician-patient interaction satisfaction is an important factor in achieving better medication adherence which also leads to better glycaemic control in this group of patients. There is a need to identify strategies to improve satisfaction in this domain to improve patient adherence.

## KEY WORDS:

*Patient satisfaction, Physician-patient relationship, Adherence, Glycaemic control*

## INTRODUCTION

Physician-patient interaction satisfaction is an important outcome in delivering health care services. A meta-analysis shows that there is a positive relationship between patient

adherence and interaction with their physicians; and that patients were twice more likely to adhere to medication if the physician is a good communicator.<sup>1</sup> There is also a positive relationship between physicians giving thorough information and clear explanation with adherence to treatment in diabetes.<sup>2</sup> Another study demonstrated the importance of active listening and positive communication for adherence to treatment across various health conditions.<sup>3</sup> This is particularly important amongst chronic disease patients whom were reported to be frequently dissatisfied<sup>4</sup> and can negatively influence their adherence to medication.

According to the 2020 projection, the prevalence of type-2 diabetes mellitus (T2DM) in Malaysia is likely to rise further.<sup>5</sup> On the other hand, the number of patients achieving glycaemic control have decreased compared to previous years, with prevalence of diabetes complications continue to be on the rise.<sup>6</sup> One of the factors that influenced the achievement of glycaemic control was medication adherence where higher medication adherence is associated with better glycaemic control.<sup>7,8</sup> Apart from glycaemic control, poor medication adherence is also associated with increased all-cause mortality in patients with T2DM receiving insulin.<sup>9</sup>

In Malaysia, the only local literature supporting the positive association between patient satisfaction and medication adherence in T2DM patients was a study amongst patients attending the medication therapy adherence clinic (DMTAC) run by pharmacists.<sup>10</sup> However, the role of pharmacists and physicians do differ, and ultimately decision making with regards to treatment will be made by the physician. Therefore, it would be important to know if physician-patient interaction satisfaction would influence the patient's adherence to prescribed medication; and if there are associative factors. This will then help the physician to formulate a strategy that could enhance and improve the consultation to ensure higher level of medication adherence. Better adherence in turn will translate into better control and reduced complications.

In view of paucity of evidence, the objective of this study is to determine the relationship between physician-patient interaction satisfaction with medication adherence and glycaemic control among patients with T2DM on insulin in the Malaysian primary care setting.

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## MATERIALS AND METHODS

### *Study design and patient selection*

This was a cross-sectional study conducted in two government health clinic facilities in the district of Gombak, Selangor, Malaysia between March to May 2016. All T2DM patients on insulin above 18 years old who received follow up care in the clinic within the last one year and able to communicate and read in Malay were invited to participate in the study. Those with T1DM, reduced mental capacity and pregnant were excluded. Sample size was calculated using Kelsey's method<sup>11</sup> with 95% confidence interval and power value of 80%, giving the final sample size with 20% attrition rate as 178 patients. The study protocol was explained and patients who consented to participate were given a set of patient information sheet, consent form and questionnaire. The questionnaire was self-administered, with guidance from the researcher if needed. Permission to conduct the study was obtained from National Institute of Health and the Medical Research and Ethics Committee, Ministry of Health Malaysia and from the University Ethics Committee.

### *Assessment and measures*

The independent variable for this study is the participant's demographic and clinical background, and physician-patient interaction satisfaction score. The dependent variable, or the outcome of this study is medication adherence and overall glycaemic control which is represented by the A1c.

The patient self-administered questionnaire documented the demographic details which includes the age, gender, ethnicity, highest level of education attained, occupation and smoking status. Data on patient's physical and clinical characteristics were also obtained which includes body mass index (BMI), blood pressure, latest HbA1c in the past six months prior to the commencement of the study, number of medications taken, and the type of insulin regime administered. Patient-physician interaction satisfaction were measured using 'Skala Kepuasan Interaksi Perubatan (SKIP-11).<sup>12</sup>

SKIP-11 is the translated and validated Malay version of the Medical Interview Satisfaction Scale (MISS-21) which in total consists of 11 questions representing three subdomains of physician-patient interaction satisfaction. There are four questions pertaining to information provision ("Distress relief" subdomain), four questions regarding the physician's communication skills ("Rapport" subdomain) and three questions assessing the adherence intent as an outcome of the overall interaction experience ("Interaction outcome" subdomain). All 11 items were scored using a 5-point Likert scale whereby for positively worded items, score '5' is for 'strongly agree' and score '1' is for 'strongly disagree'. For the negatively worded items, score 1 is for 'strongly agree' and score '5' is for strongly disagree. Each response will be added together to give a total score within the range of 11 (minimum) and 55 (maximum). Total score for each subdomain was also calculated and analysed where the minimum and maximum score is determined by the number of items present in each subdomain. The levels of satisfaction will be determined by the proximity of the score to either the minimum or maximum score for each subdomain. The closer

proximity of the score to the maximum score will reflect good satisfaction level and vice versa.

Patient's medication adherence was measured by patient self-report to the single item question, "Over the past 7 days, how many times did you miss a dose your medication?" Patients who responded no missing doses were categorised as fully adherent while those with any missing doses were categorised as less than fully adherent.<sup>13</sup>

### *Data and statistical analysis*

The results for sociodemographic, clinical and medication characteristics, SKIP-11 scores and medication adherence categories were described using descriptive statistics. The categorical variables were presented as frequency and percentages; and the continuous variables were presented in mean and standard deviation where appropriate. Multiple logistic regression was performed to determine associated factors of physician-patient interaction according to its three subdomains and associated factors of medication adherence. Multiple linear regression was applied to determine satisfaction subdomains which is associated with glycaemic control (HbA1c). The level of significance used for this study was set at alpha of 0.05 at 95% confidence level. All analyses were performed using the statistical package SPSS version 23 for Windows (SPSS Inc. Chicago, IL, 2009).

## RESULTS

A total of 320 questionnaires were distributed and 238 participants completed the questionnaire with a response rate of 74%. The final total participants were 197 due to invalid questionnaire response and non-availability of recent HbA1c results. The mean age was 57.12 (SD: 9.27).

Table I shows the participants socio-demographic and clinic background information. The majority were Malay, female, unemployed with mean BMI of 27.5.

Figure 1 displayed the mean score for each subdomain. The total mean SKIP-11 score was 42.1±2.87 SD. The sub domain "Rapport" showed higher mean score (15.81±1.41 SD) compared to "Distress relief" (15.75±1.36 SD) and "Interaction outcome" (10.52±1.63 SD).

Table II shows results from multiple linear regression which found no significant factors associated with satisfaction score in "Distress relief" and "Rapport" sub domains. However, in the "Interaction outcome" subdomain, multiple linear regression confirmed that patient education level, number of oral anti-diabetic medication taken, and type of insulin regime were associated with satisfaction score. The predicted satisfaction score in this subdomain for patients on more than one type of oral anti diabetic agent is 1 point lower than patients not taking any oral anti diabetic agent ( $p<0.05$ ). While in terms of insulin regime, the predicted satisfaction score in this subdomain for those on basal bolus regime is also 1 point lower than patients on basal insulin regime only ( $p<0.05$ ).

Figure 2 showed the adherence level amongst the study participants whereby 62.9% achieved full adherence. None of

the demographic and clinical background characteristics were associated with adherence level (Table III). Preliminary bivariate analysis showed that those who were fully adherent had higher mean Interaction Outcome subdomain scores (Table IV).

Table V summarises the relationship between physician-patient interaction satisfaction subdomain scores and medication adherence. Multiple logistic regression showed that those with higher “Interaction outcome” score are 1.2 times more likely to achieve full adherence and this is statistically significant ( $p < 0.05$ ).

Table VI described the relationship between physician-patient interaction satisfaction subdomains and the participants’ HbA1c reading. Multiple linear regression showed that increased “Interaction outcome” subdomain score is associated with decreased HbA1c by 0.25 point ( $p < 0.005$ ).

**DISCUSSION**

This study showed that the participants were mostly satisfied with the overall information provision and communication skills of their physician during their interaction in clinic which is reflected by high scores in the “Distress Relief” and “Rapport” subdomains. These results are similar to previous studies where the patient’s confidence in doctor, good interpersonal manners and relationship were predictors of patient satisfaction.<sup>14-18</sup> These findings also correspond with other studies where the physician’s communication skill and information provision determine patient satisfaction.<sup>4,14,16,19</sup>

This study found that patient education level, number of oral anti-diabetic medication taken, and type of insulin regime used affected the interaction outcome between patient and physician. The participants receiving at least secondary level education had less satisfaction in their interaction outcome with their physicians compared to those who received no formal education. This is similar to previous studies which showed that less educated patients were more satisfied compared to higher educated patients.<sup>20,21</sup> In terms of

medications, participants not taking any oral anti diabetic agent has better interaction outcome compared to those taking more than 1 type of oral anti diabetic agent. Similarly, in terms of insulin regime, participants taking once a day basal insulin were more satisfied than those taking basal bolus regime. This is similar to previous studies where

**Table I: Socio-demographic and clinical background information of the participants**

	n (%)
Gender	
Male	83 (42.1%)
Female	114 (57.9%)
Age group	
<40	10 (5.1%)
41-50	33 (16.8%)
51-60	82 (41.6%)
>60	72 (36.5%)
Ethnic group	
Malay	132 (67%)
Chinese	20 (10.2%)
Indian	45 (22.8%)
Others	0
Education level	
None	12 (6.1%)
Primary school	74 (37.6%)
Secondary school	81 (41.1%)
Tertiary	30 (15.2%)
Employment status	
Employed	66 (33.5%)
Unemployed	131 (66.5%)
Smoking status	
Smoker	27 (13.7%)
Non-smoker	170 (86.3%)
Weight	
Not obese (BMI <23)	29 (14.7%)
Pre-obese (BMI 23-27.4)	76 (38.6%)
Obese (BMI >27.5)	92 (46.7%)
Type of insulin regime	
Basal only	55 (27.9%)
Pre-mixed	94 (47.7%)
Basal bolus	48 (24.4%)
Number of oral anti-diabetics taken	
None	24 (12.2%)
1 type	124 (62.9%)
>2 types	49 (24.9%)

**Table II: Factors associated with satisfaction score in the ‘Interaction Outcome’ subdomain using multivariate analysis**

Variables	SLRa		MLRb	
	b (95% CI)	p value	b (95% CI)	p value *
<b>Patient education level</b>				
None	1		1	
Primary	-0.288 (-1.265, 0.688)	0.561	-0.195(-1.157,0.766)	0.689
Secondary	-1.093 (-2.063, -0.122)	0.028	-1.022 (-1.977, -0.066)	0.036
Tertiary	-0.567 (-1.638, 0.505)	0.298	-0.406 (-1.459, 0.647)	0.448
<b>No of oral anti diabetic medication taken</b>				
None	1		1	
1 type	-0.832 (-1.539, -0.126)	0.021	-0.872 (-1.557, -0.188)	0.013
>2 types	-0.325 (-1.111, 0.461)	0.416	-1.332 (-2.554, -0.110)	0.033
<b>Type of insulin regime</b>				
Basal only	1		1	
Premixed	-0.435 (-0.974,0.105)	0.114	-1.043 (-2.109, 0.022)	0.055
Basal bolus	-0.865 (-1.484, -0.247)	0.006	-1.361 (-2.458, -0.265)	0.015

a Simple linear regression  
 b Multiple linear regression  
 \*p-value is significant at the 0.05 level.

Table III: Participants characteristics according to medication adherence categories

Participants characteristics	Medication Adherence Score, n (row %)		X <sup>2</sup>	p-value
	Fully adherent	Not fully adherent		
<b>Age, years</b>			0.924	0.820
<40	5 (50)	5 (50)		
41-50	20 (60.6)	13 (39.4)		
51-60	53 (64.6)	29 (35.4)		
>60	46 (63.9)	26 (36.1)		
<b>Gender</b>			0.449	0.503
Male	50 (60.2)	33 (39.8)		
Female	74 (64.9)	40 (35.1)		
<b>Ethnicity</b>			0.809	0.667
Malay	83 (62.9)	49 (37.1)		
Chinese	11 (55)	9 (45)		
Indian	30 (66.7)	15 (33.3)		
<b>Education level</b>			1.185	0.757
None	9 (75)	3 (25)		
Primary	48 (64.9)	26 (35.1)		
Secondary	49 (60.5)	32 (39.5)		
Tertiary	18 (60)	12 (40)		
<b>Employment status</b>			0.020	0.886
Employed	42 (63.6)	24 (36.4)		
Unemployed	82 (62.6)	49 (37.4)		
<b>Smoking status</b>			2.937	0.087
Smoker	13 (48.1)	14 (51.9)		
Non-smoker	111 (65.3)	59 (34.7)		
<b>Weight</b>			4.937	0.085
Not obese (BMI <23)	13 (44.8)	16 (55.2)		
Pre-obese (BMI 23-27.4)	49 (64.5)	27 (35.5)		
Obese (BMI >27.5)	62 (67.4)	30 (32.6)		
<b>Insulin</b>			2.661	0.264
Basal	38 (69.1)	17 (30.9)		
Pre-mix	59 (64.1)	33 (35.9)		
Basal bolus	27 (54)	23 (46)		
<b>Oral anti-diabetics</b>			0.837	0.658
None	14 (58.3)	10 (41.7)		
1 type	76 (61.8)	47 (38.2)		
> 2 types	34 (68)	16 (32)		

Table IV: Mean difference in SKIP-11 subdomains between participants adherence scores

Variables	Distress relief			Rapport			Interaction outcome		
	Mean (+SD)	t-test	p value	Mean (+SD)	t-test	p value	Mean (+SD)	t-test	p value
Adherence level		1.035	0.302		0.074	0.941		-2.12	0.035
Fully adherent	15.67 (1.35)	(195)		15.81 (1.57)	(195)		10.71 (1.58)	(195)	
Not fully adherent	15.88 (1.37)			15.82 (1.11)			10.21 (1.67)		

\*independent t-test

Table V: Final model for physician-patient interaction satisfaction (SKIP-11) subdomain associated with medication adherence

Variable	B	S. E	Wald statistics (df)	p value	Adjusted OR	95% CI
Distress relief	-0.128	0.129	0.985 (1)	0.321	0.880	0.683, 1.133
Rapport	0.043	0.122	0.123 (1)	0.726	1.044	0.822, 1.325
Interaction outcome	0.185	0.092	4.075 (1)	0.044	1.204	1.005, 1.441

S. E= Standard Error, OR= Odds Ratio, CI=Confidential Interval

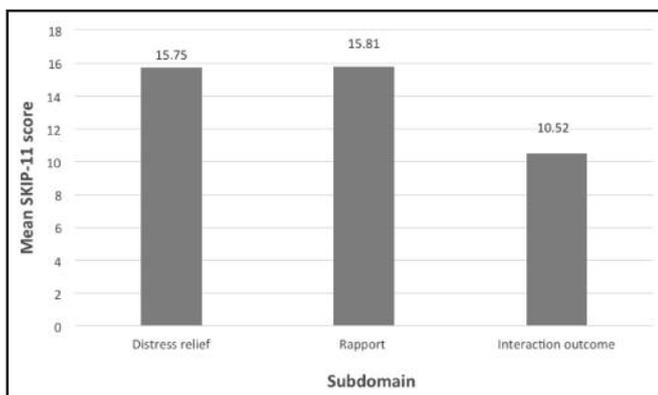
\*p-value is significant at the 0.05 level.

**Table VI: Final model for physician-patient interaction satisfaction (SKIP-11) subdomain associated with glycaemic control (HbA1c)**

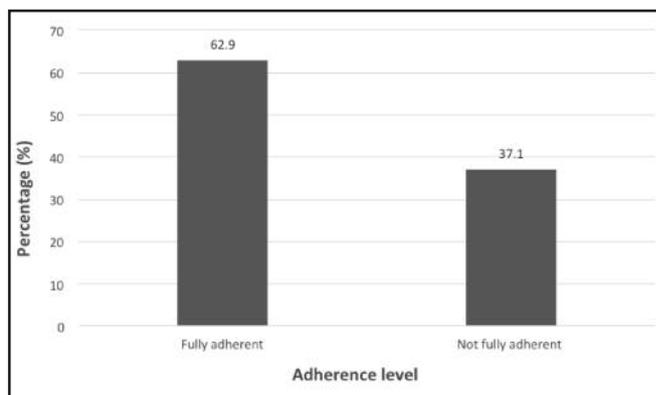
Variable	B	S.E B	$\beta$	t	p-value	95% CI
Distress relief	0.117	0.127	0.073	0.92	0.359	-0.133,0.367
Rapport	0.025	0.122	0.016	0.20	0.840	-0.265, 0.216
Interaction outcome	0.250	0.094	0.189	2.67	0.008	-0.435, -0.065

S. E= Standard Error, CI=Confidential Interval

\*p-value is significant at the 0.05 level.



**Fig. 1:** Physician-patient interaction satisfaction (SKIP-11) score according to subdomain among the participants.



**Fig. 2:** The distribution of the participant's adherence level. Distribution of patients based on adherence level.

patients on basal insulin only reported higher satisfaction score compared to those on twice a day premixed insulin.<sup>22,23</sup> These findings were due to the simpler regime being more convenient and flexible compared to multiple injections.<sup>22</sup>

The proportion of participants who reported not fully adherent was up to 37.1%. This is slightly lower than other local studies which reported 40-60% of patients who has low adherence.<sup>24-26</sup> This study found no association between the demographic or clinical background with adherence level; however, those with higher interaction outcome satisfaction score was 1.2 times more likely to report full adherence. This is consistent with previous study where physician-patient concordance was related to medication adherence.<sup>27</sup> This degree of patient's agreement and ability to adhere to physician's recommendation can also be inferred to patient's self-efficacy, whereby a person is able to perform self-management which includes medication intake as directed. Previous study has shown that there is relationship between self-efficacy and medication adherence.<sup>28</sup>

There were previous studies where patient's perceived satisfaction with physician's ability to communicate regarding their illness was associated with better medication adherence.<sup>14,29</sup> A meta-analysis which looked at interventions to improve communication skills training for physician was found to have a significant positive effect on patient adherence.<sup>1</sup> This suggest that interaction satisfaction in these 2 subdomains still played a vital role in improving medication adherence. In contrast the findings in this study did not demonstrate significant relationship between satisfaction in the information provision and communication skills subdomain. Further study to look at other possible barriers which have impact on achieving better adherence

despite satisfaction in these subdomains will be important to rectify this issue.

This study also found that better patient and physician interaction outcome is associated with lower HbA1c. This is similar to previous literature where overall satisfaction including physician patient interaction and HbA1c showed a significant positive correlation.<sup>30</sup> Baseline analysis from the global MOSAic (Multinational Observational Study assessing Insulin use: understanding the challenges associated with progression of therapy) study also demonstrated significant relationship between aspects of physician-patient interaction, insulin adherence and HbA1c level. This study supported the importance of physician-patient interaction as it has direct association with glycaemic control. The underpinning theory to this finding, which has been supported by a randomized controlled trial, is that a positive physician-patient interaction prompts better engagement and attentiveness during clinic visit which then leads to better outcomes including glycaemic control.<sup>31</sup> In order to foster positive physician-patient interaction, physician training in communication skills is important.

Studies of interventions conducted to improve communication behaviours which includes physician training has been showed to benefit not only the physician but patient alike. Physicians in the intervention group were more likely to exhibit patient-centred communication behaviours, while the patients are more likely to exhibit greater involvement during the consultation.<sup>32</sup> Training physicians in communication skills has also been shown to improve patient adherence by 12%.<sup>1</sup> An observational study also showed that a relationship-centered communication skills training has effectively improved measures of patient

satisfaction.<sup>33</sup> This highlights that communication skills training is essential in improving patient outcomes.

#### STRENGTH AND LIMITATIONS OF THE STUDY

This study provided quantitative evidence on association between physician-patient interaction satisfaction and medication adherence among type 2 diabetes mellitus patients on insulin therapy in the primary care setting. This will add on to current evidence on the importance of physician-patient interaction satisfaction in relation to medication adherence. The participants studied were also from a wide range of socio-demographic background which takes into account differences in environment and culture that impacts physician-patient interactions.

There were however, several limitations of this study. Since the study was only conducted in 2 urban health clinics, the findings could not be generalised to all type 2 diabetic patients on insulin therapy. Patients attending the rural or secondary and tertiary care centres might have different results due to other underlying factors. The cross-sectional design of the study means that direct causation between satisfaction and adherence could not be made just based on this study.

#### CONCLUSION AND RECOMMENDATION

This study demonstrated that the most important determinant for patient satisfaction and medication adherence is the patient and physician Interaction outcome which is the degree of patient's agreement and ability to adhere to physician's recommendation after consultation. Thus, at the clinical practice level, efforts should be made to identify any problems or barriers that causes patient not to agree or unable to follow the physician's recommendation during consultation. Further intervention type research in identifying ways to improve the interaction outcome between patient and physician to increase medication adherence as well as to achieve better treatment targets is recommended.

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#### CONFLICT OF INTEREST

NM Nasir, F Ariffin and SM Yasin declare that they have no competing interests.

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