PERCEIVED QUALITY OF HEALTH CARE BY HEALTH CARE SYSTEM LEVEL AMONG TYPE 2 DIABETIC PATIENTS IN NORTHERN THAILAND

Artittaya Wangwonsin, Wutthichai Jariya and Chakkraphan Phetphum

Faculty of Public Health, Naresuan University, Phitsanulok, Thailand

Abstract. Quality of healthcare may affect disease outcomes. In this study, we aimed to determine the perceived quality of healthcare by healthcare system level among type 2 diabetes patients (T2DM) in order to inform healthcare interventions to improve outcomes in these patients. The system levels evaluated were health centers without a physician (n=5), health centers with a physician (n=5), district hospitals (n=5) and provincial hospitals (n=3). Study subjects were purposely selected from T2DM attending the study institutions. Each subject was asked to complete the Thai Patient Assessment of Chronic Illness Care (Thai PACIC) questionnaire. A total of 1408 subjects were included in the study (health centers without a physician: n=522; health centers with a physician: n=183; district hospitals: n=413; provincial hospitals: n=290). Seventy-three point five percent of subjects were female; the mean age of study subject was 57.4 years. The Thai PACIC was scored from 0 to 100; the higher the score the better the perceived quality of care. The mean Thai PACIC scores for health centers without a physician, health centers with a physician, district hospitals and provincial hospitals were 80.0, 79.6, 81.6 and 72.0, respectively. All levels of healthcare institutions were perceived by subjects to provide "adequate" health care but these can be improved. The mean overall Thai PACIC score for the provincial hospitals was significantly ($p < 0.05$) lower than the other levels. Further studies are needed to determine why the perceived quality of care at provincial hospitals was lower than the other levels and if this associated with poorer outcomes.

Keywords: quality of chronic illness care, Patient Assessment Chronic Illness Care (PACIC), Diabetes Mellitus

INTRODUCTION

The quality of healthcare may affect outcomes among patients with type 2 diabetes mellitus (T2DM). This quality of care can be assessed from either the health care provider perspective or the patient perspective. The Chronic Care Model (CCM) aims to improve quality of care among patients with chronic disease (Wagner *et al*, 2001; Pearson *et al*, 2005). The instrument used to evaluate healthcare quality from the provider perspective is the Assessment of Chronic Illness Care (ACIC) (Bonomi *et al*, 2002). This instrument is subject to health care provider bias. An instrument that assesses the quality of care from the patient perspective, attempting to overcome this

Correspondence: Artittaya Wangwonsin, Faculty of Public Health, Naresuan University, Phitsanulok Province, Thailand
Tel: +66 (08) 1379 0288; Fax; +66 (055) 961103; E-mail: artittaya12@gmail.com

bias, is the Patient Assessment of Chronic Illness Care (PACIC) (Glasgow *et al*, 2005a). The English PACIC was developed and validated in the United States; it consists of a 20-item survey divided into five domains assessing the different aspects of the application of the CCM: 1) patient activation, 2) delivery system/practice design, 3) goal setting/tailoring, 4) problem solving/contextualization, and 5) follow-up/coordination (Glasgow *et al*, 2005a; Glasgow *et al*, 2005b). Patient activation is defined as the act of getting the patient involved in decision-making (Glasgow *et al*, 2005a; Glasgow *et al*, 2005b). Delivery system/practice design is defined as the act of providing information to patients and organizing care of patients to improve their understanding of their care (Glasgow *et al*, 2005a; Glasgow *et al*, 2005b). Goal setting/tailoring is defined as the act of supporting patients in setting specific collaborative goals (Glasgow *et al*, 2005a; Glasgow *et al*, 2005b). Problem-solving/contextualization is defined as the act of encouraging patients to consider potential barriers to care and contextualizing the social and cultural environment in order to make treatment plans (Glasgow *et al*, 2005a; Glasgow *et al*, 2005b). Follow-up/coordination is defined as the act of arranging continuing care and making contact with the patient to assess progress and coordinate care (Glasgow *et al*, 2005a; Glasgow *et al*, 2005b).

The PACIC has been utilized worldwide to assess the patient perspective of quality of care for a variety of chronic diseases, such as: diabetes, ischemic heart disease and hypertension (Taggart *et al*, 2011). It has been translated into Dutch (Wensing *et al*, 2008), German (Gensichen *et al*, 2011), Spanish (Aragones *et al*, 2008) and Thai (Wangwonsin *et al*, 2016). The Thai version (Thai PACIC) is comprised of 14 items with 2 domains: self-management support (SMS) (10 questions) and self-care (SC) (4 questions). The 14 questions are answered using a 5-point Likert scale: 1 = almost never to 5 = almost always. The Thai PACIC had been previously tested for reliability and had a Cronbach's alpha of 0.923 (Wangwonsin *et al*, 2016). SMS is defined as the support diabetic patients receive from health care personnel, such as receiving healthcare information, being given a choice about treatment, receiving counseling and motivation in caring for their illness, being contacted after their visit and checking their health status in the community (Wangwonsin *et al*, 2016). SMS also involves the accountability of patients and their families in managing their care (Wangwonsin *et al*, 2016). SC is defined as setting self-care goals, planning and implementing of self-care activities and searching for self-care information (Wangwonsin *et al*, 2016).

Due to adoption of unhealthy behavior and an aging population in Thailand, the prevalence of T2DM among the Thai population aged >15-years increased from 6.9% in 2009 to 8.9% in 2014 (Aekplakorn, 2014). The Thai government is attempting to reduce the burden of diabetes by implementing national policies and health promotion and disease prevention programs (Reutrakul and Deerochanawong, 2016). The government is also attempting to develop referral and collaboration systems at the various levels of health care in Thailand to improve the quality of care and outcomes of diabetic patients (Patcharanarumol *et al*, 2016).

The aim of this study was to determine the perceived quality of healthcare in northern Thailand by healthcare system level among patients with T2DM in order to inform healthcare interventions to improve outcomes among these patients.

MATERIALS AND METHODS

We conducted this cross-sectional study in northern Thailand at the following healthcare system levels: 1) provincial hospitals (PH) (*n*=3), 2) district hospitals (DH) (*n*=5), 3) health centers with a doctor (HC w/ D) (*n*=5), and 4) health centers without a doctor (HC w/o D) (*n*=5). Inclusion criteria for subjects were: being a registered patient with T2DM at the study institution, being aged ≥18 years, receiving care at the study institution for their T2DM during the previous 6 months, having no complications, having a fasting blood sugar <140 mg/dl, taking only oral medication for their T2DM and being able to perform activities of daily living unassisted.

The subject sample size for this study was calculated using the infinite population proportion formula (Cochran, 1963) as follows:

$$n = \frac{Z^2_{\alpha/2}\, p(1-p)}{e^2}$$

where p is the proportion of the population aged ≥18 years with T2DM (6.9%; IHPP, 2016); $Z_{\alpha/2}$ is the confidence coefficient (1.96 with a 95% confidence interval); e is the precision of estimation (0.015). The minimum sample size was calculated to be 1097. Thirty percent of the minimum calculated sample size was added to cover for missing data a study subject sample size of 1427.

Each subject was asked to complete the Thai PACIC, asked about their socio-demographic characteristics, their health status and their comorbidity conditions. The body mass index (BMI) and waist circumstance (WC) were obtained for each subject. The socio-demographic characteristics recorded were: age, gender, marital status, education level and career. Health status data recorded were duration of having T2DM and their complications due to T2DM. The comorbidity conditions recorded were hypertension and dyslipidemia.

Due to the unequal number of items on the Thai PACIC in the two domains (10 items for the SMS and 4 items for the SC) the total score of each domain was adjusted, giving a total possible score of 100 points for each domain using the following formula (Gulliford *et al*, 2006):

$$\text{Adjusted mean} = \frac{100 \times \text{mean score of the domain}}{\text{total score of the domain}}$$

The adjusted mean score of Thai PACIC was determined to be "adequate" using the standardized rating system of Glasgow *et al* (2005a): an adjusted mean score > 60 points, or 3 out of 5 points on the Likert scale, was considered "adequate".

The data were analyzed using the Statistical Package for Social Sciences (SPSS), version 20 for Microsoft Windows (IBM, Armonk, NY). Socio-demographic characteristics and health status were analyzed using percentages, means and standard deviations. The one-way analysis of variance (ANOVA) and the Scheffe's method for multiple comparisons were used to compare the PACIC scores among the different healthcare levels. A *p*-value < 0.05 was considered statistically significant.

This study was approved by the Naresuan University Ethics Committee (Ref No. 333/58; 2016 Sep 25). All subjects gave written informed consent prior to participation in the study.

RESULTS

Socio-demographics and health status of study subjects

A total of 1408 subjects completely

answered the questionnaire and were included in the study. The mean age of the study subjects was 57.4 years; 73.5% were female. Seventy-seven point eight percent of subjects were married and 76.5% had primary school education level. Fifty point one percent of subjects worked in agriculture. The mean length of time the study subjects had diabetes was 6.2 years. The most common comorbidities among study subjects were hypertension (57.4%) and dyslipidemia (40.5%). Sixty-four percent of subjects were overweight/obese (BMI≥ 25.0 kg/m^2) (WHO, 2000); 56.3% had an elevated WC (women: ≥80 centimeters; men: ≥90 centimeters) (WHO, 2008).

The mean perceived quality of healthcare scores are shown in Table 1. The overall adjusted mean scores (± standard deviation (SD) by healthcare level were 72.0 (± 12.8), 81.6 (± 13.2), 79.6 (± 8.4) and 80.0 (± 12.2) for the PH, DH, HC w/ D and HC w/o D, respectively. The mean (±SD) adjusted SMS scores by healthcare level were 73.1 (± 12.8), 82.7 (± 13.4), 82.1 (± 8.3) and 81.1 (± 11.8) for the PH, DH, HC w/ D and HC w/o D, respectively. The mean (±SD) adjusted SC scores by healthcare level were 69.4 (± 16.5), 78.7 (± 16.1), 73.4 (± 13.5) and 77.4 (± 16.4) for the PH, DH, HC w/ D and HC w/o D, respectively (Table 1).

Comparison of the overall Thai PACIC, SMS and SC combined scores by healthcare level (Table 2) revealed the overall Thai PACIC score and the SMS and SC score for the PH were all significantly ($p < 0.05$) lower than the other healthcare levels. Comparison of the SMS and SC scores by healthcare level revealed no significant differences except the mean SC score for the DH was significantly higher ($p < 0.05$) than the SC score for the HC w/ D (Table 2).

DISCUSSION

In our study, subjects with T2DM assessed the quality of health care services by institution level. All the evaluated healthcare institutions levels in our study were perceived by subjects as giving "adequate" health care, defined as a Thai PACIC score > 60 points. Our findings are similar to a study from India by George *et al* (2015) who reported patients surveyed perceived the quality of care they received was adequate. Our findings are also similar to another study from Thailand (Khadthasrima and Kitreerawutiwong, 2016) who reported subjects perceived

Table 1
Comparison of subject perceived healthcare scores by healthcare level.

Scores	Ma (SD)	*p*-value
Overall		< 0.001
PH	72.0 (12.8)	
DH	81.6 (13.2)	
HC w/ D	79.6 (8.4)	
HC w/o D	80.0 (12.2)	
SMS		< 0.001
PH	73.1 (12.8)	
DH	82.7 (13.4)	
HC w/ D	82.1 (8.3)	
HC w/o D	81.1 (11.8)	
SC		< 0.001
PH	69.4 (16.5)	
DH	78.7 (16.1)	
HC w/ D	73.4 (13.5)	
HC w/o D	77.4 (16.4)	

Ma: adjusted mean; SD: standard deviation; SMS: self-management support; SC: self-care; PH: provincial hospital; DH: district hospital; HC w/ D: health center with doctor; HC w/o D: health center without doctor

Table 2
Multiple comparisons of subject perceived healthcare scores by healthcare level.

Settings	Ma	PH	DH	HC w/ D	HC w/o D
Overall PACIC score		72.0	81.6	79.6	80.0
PH	72.0	-	-4.8[a]	-4.5[a]	-4.0[a]
DH	81.6	-4.8[a]	-	1.3	1.1
HC w/ D	79.6	-4.5[a]	1.3	-	-0.3
HC w/o D	80.0	-4.0[a]	1.1	-.0.3	-
SMS PACIC score		72.0	81.6	79.6	80.0
PH	73.1	-	-4.0[a]	-4.5[a]	-4.0[a]
DH	82.7	-4.0[a]	-	0.3	0.8
HC w/ D	82.1	-4.5[a]	0.3	-	0.5
HC w/o D	81.1	-4.0[a]	0.8	0.5	-
SC PACIC score		72.0	81.6	79.6	80.0
PH	69.4	-	-9.5[a]	-4.1[a]	-8.0[a]
DH	78.7	-9.5[a]	-	5.4[a]	1.5
HC w/ D	73.4	-4.1[a]	5.4[a]	-	-3.9
HC w/o D	77.4	-8.0[a]	1.5	-3.9	-

Ma: adjusted mean; a: significant ($p < 0.05$); SMS: self-management support; SC: self-care; PH: provincial hospital; DH: district hospital; HC w/ D: health center with doctor; HC w/o D: health center without doctor

healthcare services quality favorably. Our finding that subjects perceived healthcare quality as adequate may be due to the implementation of the Chronic Care Model (CCM) in Thailand beginning in 2006 with the intent of improving care of chronic illness at all levels of healthcare (NHSO, 2010).

In our study, the overall Thai PACIC score and the SMS and SC scores for PH were all significantly lower than the other healthcare facilities. This may be due to a problem in the quality of healthcare in PH or it may reflect the fact that sicker patients and those with more health problems are referral to PH (Reutrakul, and Deerochanawong, 2016). Specialists at PH may not have the some ongoing relationship with patients resulting in the patients perceiving a lower level of quality care (Gijs *et al*, 2017). However, these results show healthcare providers, managers and policy makers at PH need to strengthen the quality and perceived quality of care of this patient population.

In our study, the SC score for DH was significantly higher than the SC score for HC w/ D. One possible reason for this could be because type 2 diabetes patients see the same doctor each at DH but different rotating doctors at HC w/ D, resulting in less continuity of care. Loss of continuity of care has been reported to be associated with lower SC scores (Gulliford, *et al*, 2006). The quality of care has been shown to be higher in those with a regular

healthcare provider (Rosenblatt *et al*, 2001; Tabrizi *et al*, 2008). Diabetic patients who do not have a regular healthcare provider have been found to have poorer glycemic control behaviors than those with a regular healthcare provider (O'Connor *et al*, 1998). Wagner *et al* (2001) report that to improve quality of diabetic care, a productive interaction between the healthcare provider and patient is needed. Successful self-management of diabetes requires healthcare professionals to evaluate and motivate their patients regarding self-management. Patients who receive this support develop self-confidence in self-care and are more likely to successfully change their behavior for the better (Shrivastava *et al*, 2013).

A strength of the current study was its large sample size covering multiple healthcare levels. A limitation of our study was the data was collected solely from subjects attending public institutions so the findings cannot be applied to patients receiving care at private institutions.

In summary, in this study we found the overall quality of healthcare at all levels was adequate, but the perceived quality at PH was significantly lower than the other healthcare levels. The perceived quality of care at the DH measured by the SC domain of the Thai PACIC was significantly better than the perceived quality of care at the HC w/ D. In conclusion, although the perceived quality of healthcare at the study institutions was adequate, this should be improved. Further studies are needed to develop methods to improve the perceived healthcare quality and to determine if differences in healthcare quality result in differences in patient outcomes and if improved perceived quality will result in better patient outcome.

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