Predictors of Diabetes Self-Management in Older Adults with Poorly Controlled Type 2 Diabetes Mellitus

Piyawan Kanan, Noppawan Piaseu, Porntip Malathum, Basia Belza*

Abstract: Poorly controlled type 2 diabetes, a complex phenomenon, is rapidly increasing particularly in older adults worldwide and in Thailand, the setting of this study. Effectiveness of diabetes self-management demands various factors supporting optimal outcomes. This descriptive correlational study examined the influences of ecological factors including gender, time since diagnosis, family history of type 2 diabetes mellitus, abdominal obesity, diabetes complications, health literacy, social networks, and social support on diabetes self-management. Through purposive sampling, the participants consisted of 166 older adults with poorly controlled type 2 diabetes mellitus at two hospitals in central Thailand province. Data were collected using questionnaires on the Functional, Communicative and Critical Health Literacy Scale, the revised Summary of Diabetes Self-Care Activities Scales, the Social Network in Adults Life, and the Diabetes Severity Complication Index; and nutrition assessment including waist circumference and HbA1c. Descriptive statistics and Stepwise Multiple Regression Analysis were used for data analysis.

Results revealed that health literacy, abdominal obesity, time since diagnosis, and gender could together predict diabetes self-management, accounting for 14.7% of the variance. Prior to developing an effective intervention, an additional variable more specific to older adults needs to be examined such as self-efficacy that affects older adults' confidence regarding health behavior modification. Nevertheless, these findings suggest approaches for nurses to promote diabetes self-management education that includes enhancing health literacy, and modifying health behaviors for control of abdominal obesity based on other health conditions, particularly in male older adults with type 2 diabetes mellitus.

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Introduction

The aging population is expected to increase by 22% by 2050[1] worldwide and by 16.06% in Thailand[2]. The incidence of type 2 diabetes mellitus (T2DM) is also expanding around the world[3], and

Thailand.[4] Older adults with T2DM tend to be poorly controlled (fasting plasma glucose ≥130 mg/dL), particularly those aged ≥60 years due to various causes including co-morbidities, and social isolation.[5] Moreover, the global health care cost for T2DM in 2017 rose to its highest level, indicating a high prevalence of T2DM and its complications associated with inadequate self-management in older adults.[3] T2DM leads to direct and indirect burdens at individual level and for health care, and these burdens include acute and chronic complications, and lessened well-being.[3]

Internal and external factors influence an individual's diabetes self-management including social networks, and social support within environmental contexts.[6] Individual factors including abdominal obesity[7], family history of T2DM,[8] time since diagnosis[9], diabetes complications[10], gender[11], and health literacy.[12] However, individual and environmental factors affecting diabetes self-management have mostly been studied in western countries. In Thailand, diabetes self-management remains at a low level[13] and research is limited regarding older adults with poorly controlled T2DM. Therefore, it is necessary to investigate the influences of social networks, social support levels, health literacy, and individual factors on diabetes self-management among such older adults.

Conceptual Framework and Literature Review

The conceptual framework of this study was developed based on a combination of three theories: bioecological theory[14], social networks[15], and health literacy[16]. The bioecological model[14] or Process-Person-Context-Time model (PPCT model) consists of four components: process, person, context, and time where all four elements interact with each other, leading to the development of human behaviors.[14] A process is a dynamic interaction between person and context (micro, meso, exo, and macro levels). A person is at the center of the PPCT model including demand characteristics, bioecological resources, dispositions, and demographic characteristic. The time element is that which changes regarding human development, experience, and culture across the life span.

The micro-level context of the PPCT includes abdominal obesity[7], family history of T2DM[8], time since diagnosis[9], diabetes complications[10], and gender[11] which are individual factors. Bioecological resources are skills, past experiences, intelligence, material, emotional or mental resources, and health literacy is considered as a bioecological resource associated with diabetes self-management.[12,31] Health literacy refers to "cognitive skills that determine a person's ability to access, understand and use information for health"[18, p 357], and consists of three components:[16] functional health literacy, a capability to access and understand health information; interactive health literacy, a capability to communicate health information; and critical health literacy, a capability to make decisions for behavioral change. Social networks including aspects of support from family members, partners, and friends sharing emotional closeness are also included in the micro-level and which contribute to diabetes self-management.[19]

The meso level includes social networks and aspects of support from peers, neighbors, community and religious groups[19], affecting diabetes self-management.[20] **The exo level** involves aspects of social networks in terms of support from healthcare providers.[19,21] Social networks in each aspect consist of structures, characteristics of network ties, and function.[15] Structures included size, density, and proximity. The larger the size and density, the greater the self-management.[22,23] Living in close proximity to networks promotes self-management.[24] Characteristics of network ties included frequency of contact and the more frequency of contact with social networks, the greater the diabetes self-management.[22] Social networks function (social support) provides various opportunities for self-management.[25]

Therefore, this study aimed to examine bioecological factors including personal factors (gender, diabetes complications, abdominal obesity, family history of T2DM, time since diagnosis, and health literacy) and context factors (social networks and social support at different levels) in order to predict diabetes self-management in older Thai adults with poorly controlled T2DM.

Methods

Design

This study used a cross-sectional, correlational design.

Sample and Settings

The sample included older adults with poorly controlled T2DM who visited either the non-communicable disease clinic of a community hospital or the internal medicine, endocrinology or metabolism clinics at another hospital in a central Thailand province between January-June 2017. Convenience sampling was used to select the participants according to the following inclusion criteria: (1) Aged ≥60 years with poor glycemic control (HbA1c ≥8% within three months before data collection) and diabetic complications according to the Thai Diabetes Clinical Practice Guideline[26] (2) No cognitive impairment screened by the Mini-Mental State Examination (MMSE)[27] based on education level with scores >14 for a person who was illiterate; >17 for one who was primary school educated; and > 22 for a person graduated from high school, and (3) could verbally communicate in Thai. Older adults with a psychiatric problem or severe illness such as end-stage kidney disease and cancer were excluded. The power ($1-\beta$) and significance level (α) were determined at .80 and .05, respectively. The effect size from previous studies[12,28] was 0.189, and a sample size of 150 was determined.

Ethical Consideration and Protection of Human Subjects

This study was approved by the Committee on Human Rights Related to Research Involving Human Subjects, Faculty of Medicine Ramathibodi Hospital, Mahidol University (ID 11-59-14) and the Human Research Ethics Committee of Thammasat University (No.2: ID 092/2559). The written consents were obtained and participants received explanations of their a right to withdraw from the study at any time. The study purpose and data collection process were described in detail to them and all data were kept confidential, and their privacy maintained throughout the study.

Instruments: There were 7 questionnaires used, with relevant permissions obtained from the original authors, as well as anthropometric assessment for waist circumference. Content validity was examined by three experts in diabetic self-management, sociology, and gerontology.

The Mini-Mental State Examination (MMSE), developed by Folstein, et al.,[27] was used to screen mental state, consisting of 5 dimensions with 30 items including registration (3 items), orientation (10 items), recall (3 items), attention or calculation (5 items), and language and praxis (9 items). A response was "0" for an incorrect answer and "1" for a correct answer. Possible scores ranged from 0-27 for a person who was illiterate and 0-30 for a person graduated from at least primary school. The cut-off point for dementia was 14 or lower for an illiterate person, 17 or lower for a primary school graduated person, and 22 or lower for a high school graduated person. This scale has been licensed under Psychological Assessment Resource (PAR copyright).

A demographic data questionnaire was developed by the PI consisting of two parts: personal data (gender, age, and marital status), and illness data (family history of T2DM, time since diagnosis) and the record form for waist circumference and current HbA1c.

The Functional, Communicative and Critical Health Literacy Scale (FCCHL) was designed to assess health literacy for T2DM and developed by Ishikawa et al.,[29] based on Nutbeam's work[18], then translated into Thai by Maneesriwongul[30] and modified by Prabsangob.[31] The FCCHL has 14 items: functional

health literacy (5 items), interactive/communication health literacy (5 items), and critical health literacy (4 items). A response is given on 4-point Likert scale ranging from "often" (4) to "never" (1). The scores are reversed for functional health literacy, and summed in each dimension and averaged, then classified into three levels: high (3.1-4.0), moderate (2.1-3.0), and low health literacy (1.0-2.0). An example question for functional health literacy is "In reading recommendations or medicine labels, you found that the print was too little to read."[29]

The original FCCHL[29] provided appropriate internal consistency on functional health literacy (Cronbach's α = .84), communication health literacy (α = .77), critical health literacy (α = .65), and total scale (α = .78). The Thai-FCCHL[31] was tested for psychometric properties, obtaining good internal consistency (α = .94). In this study, the Thai-FCCHL provided good reliability (α = .92).

The revised *Summary of Diabetes Self-Care Activities Scales - Thai version* (SDSCA-Thai version) was translated[32] from the original version of Toobert, et al.[33] It is used to assess the frequency of diabetes self-management in the past week. This scale consists of 5 dimensions with 19 items: exercise (2 items), medication (2 items), diet including general diet (3 items) and specific diet (4 items), foot care (5 items) and self-monitoring (3 items). Responses range from 0-7; higher scores indicate a higher level of diabetes self-management. Interpretation for each dimension included high (4.67-7), moderate (2.34-4.66), and low (0-2.33). Possible total scores range from 0-133. Overall scores of diabetes self-management are classified into high (88.67-133), moderate (44.34-88.66), and low (0-44.33).

The original version of SDSCA provided good content validity, and construct validity[33], and the revised SDSCA-Thai version provided high inter-item correlations within components (.43) and test-retest reliability (.89).[32] In the present study, the reliability using Cronbach's alpha was .65.

The Social Network in Adult Life Questionnaire (SNAL) was designed to assess social networking, developed by Antonucci and Akiyama[34], and translated into Thai by the PI with a back-translation technique. The SNAL questionnaire includes a set of three concentric circles in a diagram with five questions designed to measure the components underpinning social networks including size, density, proximity, frequency of contact by any approach, and social support. The term "You" is identified at the center of the three concentric circles. Each level of the circle represents the degree of emotional closeness and involvement in diabetes self-management; and our participants were asked five questions regarding the social network components in each level of the circle. Based on size, the participants were asked to identify how many people were involved in their diabetes self-management; the higher number indicated the larger size of social network. For density, the participants or their proxies were asked to identify how many people they have known and contacted one another; then the PI calculated density based on the formula (number of people they mentioned divided by all possible social networks they had). A typical density ranged from 0-1; high density closed to 1 indicated a high range to which social networks were joined together and could provide better support. Regarding proximity, the participants were asked how many people could drive or visit them within an hour when they needed help for diabetes self-management. Proximity ranged from 0 (referring to none) to 1 (referring to at least 1, then specifying the number of people). In addition to the frequency of contact, the participants were asked how frequently and by what modes did they contact their social networks; frequency of contact ranged from 1 (irregularly) to 5 (daily or living together). For social support, the participants were requested to value each social network contributing to diabetes self-management, ranging from 0 (no contribution to any activities) to 10 (maximal contributions to all activities). The higher score indicated a higher level

of social support. The interpretation of this is based on a score in each component of social networks. The content validity index was 1; the participants' intra-rater reliability was 1.

The Diabetes Complications Severity Index (DCSI), developed by Young, et al.[35] is used to measure diabetes complications severity, and consists of seven aspects: nephropathy (11 items), retinopathy (10 items), cerebrovascular condition (2 items), neuropathy (10 items), peripheral vascular disease (10 items), metabolic condition (3 items) and cardiovascular condition (11 items). The response scale ranges from 0 (no) to 1 (yes) or 0 (no abnormality) to 2 (severe abnormality) based on ICD-9 criteria. The possible score range is 0-80; a higher score indicates higher severity of diabetes. The PI collected data from the participant's medical record. The content validity and criterion-related validity of the original DCSI were good.[35]

Glycosylated hemoglobin (HbA1c) was tested through the Health Service Center of the university where procedures are standardized and certified by the external quality assessment program in hemoglobin A1c from the National Glycohemoglobin Standardization Program (NGSP), USA. Blood samples were taken from all participants in the morning of the appointment. The most recent HbA1c within three months was also recorded from the medical profiles. The tentative participants with the most recent HbA1c ≥ 8% were included in this study.

A non-stretchable plastic tape was used to measure waist circumference (WC). A measurement was at the level of the umbilicus in the participants in an upright position[36]; normal criteria for waist circumference was <90 cm in males and <80 cm in females.[36]

Data Collection

The potential participants were screened according to the inclusion criteria. Once the inclusion criteria were met and the informed consent obtained, the PI undertook the structured interviews with the questionnaires on demographics, the FCCHL-Thai version[31], the revised SDSCA-Thai version[32], the SNAL-Thai version, and the DSCI.[35] A blood sample was taken for the current HbA1c; then waist circumference was assessed while the participants were in a private area, lasting approximately 20 minutes.

Data Analysis

Descriptive statistics were used for demographic data, social networks (size, density, proximity, frequency of contact, and social support levels), health literacy, and diabetes self-management. Since the interclass correlation (ICC) was .0, which was less than .2 according to Hierarchical Linear Modeling assumptions. Hence, Stepwise Multiple Regression Analysis (MRA) was applied to examine the influences of ecological factors on diabetes self-management. The assumptions were met including normality, linearity, homoscedasticity, independence of errors, and no multicollinearity among independent variables. Categorical variables were coded as follow: gender (0 = male, 1 = female); family history of T2DM (0 = no; 1 = yes); proximity (0 = no; 1 = yes); and frequency of contact (0 = daily; 1 = others).

Results

The mean age of the 166 participants was 71.26±6.99, ranging from 60-92 years. More than half were female (59.6%); were married (62.7%); had a family history of T2DM (51.2%). Time since diagnosis was 13.84±8.09 years; the waist circumference was 96.67±13.22 cm in females, and 93.01±12.35 cm in males. The overall health literacy was at a moderate level. The median of social network size, density, and social support level was 2, 1, and 10, respectively. The overall score for diabetes self-management was 4.97±.87. The medication subscale was the highest, following by self-monitoring, foot care, dietary control and exercise was the lowest due to limitations from health problems such as hip fracture, osteoarthritis knee, and post-coronary artery bypass grafting. The mean HbA1c was 9.99±1.89% (**Table 1**).

Table 1 Description of Ecological Factors, Diabetes Self-Management, and Current HbA1c (n = 166)

Variables	Possible Range	Mean±SD	Min-Max	Interpretation
Time since diagnosis		13.84±8.09	5-40	-
Waist Circumference				
- Female				
< 80 cm		n=7, 7.1%		Normal
≥ 80 cm		n=92, 92.9%		Abdominal obesity
- Male				
< 90 cm		n=24, 35.8%		Normal
≥ 90 cm		n=43, 64.2%		Abdominal obesity
Diabetes Complications	0-80	4.20±2.21	0-10	-
Health literacy				
- Overall	1-4	2.60±.85	1-4	Moderate
Social network				
- Size		2.90±1.96, median =2	0-10	-
- Density	0-1	.81±.34, median = 1	0-1	-
- Social support level	0-10	8.34±3.06, median = 10	0-10	-
Diabetes self-management				
- Overall score	0-133	94.43±16.22	49-133	High
- Overall (days/week)	0-7	4.97±.87	2.58-7.00	High
- Dietary control	0-7	4.74±.92	1.86-7.00	High
- Exercise	0-7	2.21±1.94	0.00-7.00	Low
- Self-monitoring	0-7	5.82±1.48	1.67-7.00	High
- Foot care	0-7	5.22±2.31	0.00-7.00	High
- Medication	0.7	6.63±1.22	0.00-7.00	High
HbA1c (%)		9.99±1.89	8.00-14.1	-

The correlation matrix of ecological factors (personal factors and context factors) and diabetes self-management revealed that health literacy, time since diagnosis, and gender were positively correlated with diabetes self-management with low correlation coefficients. Also, a family history of T2DM and waist circumference were negatively correlated with diabetes self-management with the low correlation coefficient. The remaining ecological factors (diabetes complications, social network size, density, proximity, a frequency of contact, and social support level) were not correlated with diabetes self-management (Table 2).

Stepwise multiple regression analysis revealed that the strongest predictive factor was health literacy, following by waist circumference, time since diagnosis, and gender, respectively. According to the Stepwise MRA procedure, the result of final model revealed that health literacy ($\beta = 4.930$, $p < .01$), time since diagnosis ($\beta = .325$, $p < .05$), and gender ($\beta = 5.329$, $p < .05$) could positively predict diabetes self-management, whilst waist circumference ($\beta = -.219$, $p < .05$) could negatively predict diabetes self-management which jointly accounted for 14.7% of the variance (Table 3).

Table 2 Pearson's Correlation Coefficient for Diabetes Self-Management (n = 166)

Variables	ODSM	GENER	TIME	FAM	WC	DC	HL	SIZE	DEN	PRO	FRE	SS
ODSM	1											
GENDER	.140*	1										
TIME	.211**	.010	1									
FAM	-.190**	.042	-.165*	1								
WC	-.198**	-.141	-.165*	-.068	1							
DC	.023	-.087	.360**	-.050	.013	1						
HL	.229**	-.170*	.092	-.250**	.074	-.182*	1					
SIZE	.062	.066	-.029	-.036	.119	.119	.068	1				
DEN	-.100	.029	-.111	.117	.133	.078	-.031	.426**	1			
PRO	-.092	.038	-.012	.124	.091	.003	-.060	.239**	.495**	1		
FRE	.023	.161*	-.008	.051	-.074	-.116	.195	-.085	-.165*	-.406**	1	
SS	-.072	.050	-.101	.103	.083	.083	-.046	.388**	.703**	.527**	-.178*	1

*p < .05, **p<.01

ODSM = overall diabetes self-management, GENDER = gender, TIME = time since diagnosis, FAM = family history of T2DM, WC = waist circumference, DC = diabetes complication, HL = health literacy, SIZE = social network size, DEN = density, PRO = proximity, FRE = frequency of contact, SS = social support

Table 3 Stepwise Multiple Regression Analysis for Diabetes Self-Management (n = 166)

Variables	b	Std.	Beta	*t*	*p*
Constant	94.597	10.561		8.957	<.001
1. Health literacy	4.930	1.443	2.54	3.416	.001
2. Waist circumference	-.219	.097	-.169	-2.259	.025
3. Time since diagnosis	.325	.152	.159	2.138	.034
4. Gender	5.329	2.511	.158	2.122	.035

$R = .384$, $R^2 = .147$, R^2 adj. = .126, $F = 4.503$, $p = .035$

Discussion

The Stepwise MRA revealed that health literacy, time since diagnosis, gender, and waist circumference together predicted diabetes self-management. According to the PPCT Model[14], all the predictors were micro-level factors, strongly influencing diabetes self-management. Gender influenced diabetes self-management since the female was more energetic in self-care and seeking information more than males, consistent with the previous study.[17] Also, time since diagnosis influenced diabetes self-management. One explanation is that people with a longer history of T2DM might have more skills in diabetes care.[10] Moreover, abdominal obesity was a barrier for older adults with poorly controlled T2DM in self-management; it was possible that females, rather than males, who were obese had more limitations in physical activity resulting in a barrier to diabetes self-management.[37] Health literacy influenced diabetes self-management, consistent with an earlier study[11] since people could evaluate the quality of both content and sources of health information they obtained in addition to a need to comprehend health information; as a result, they could properly modify their health behaviors.[12]

However, family history with T2DM had no influence on diabetes self-management, consistent with a previous study[38]; this might be due to the experiences of family members with T2DM not inducing people to perform diabetic behaviors.[38]

Moreover, diabetes complications did not influence diabetes self-management because the mean severity of diabetes complications was low based on the DSCI scoring (4.2 out of 80).

Regarding the exo-level factors in the PPCT Model[14], we found that social network size and density had no influence on diabetes self-management because a majority of the social network resources in this study was focused on family members and spouses. This is consistent with a previous study[24], indicating that older adults with T2DM had limited chances for entering support resources.[24] Proximity and frequency of contact had no influence on diabetes self-management because both aforementioned factors had both promoting and inhibiting effects on self-management and self-management competency.[39] The social support level did not affect diabetes self-management as stated in the previous evidence[15] because not all types of social support have impacts on diabetes self-management.[15]

The final model predictability was only 14.7%. This might be due to there being more specific factors affecting diabetes self-management that need to be examined among older adults with poorly controlled type 2 diabetes. We further analyzed the association between diabetes self-management and the current HbA1c and found no significant association. This might be due to HbA1c depending on other factors such as T2DM onset[40] because people getting diabetes at an older onset are likely to have better glycemic control than younger age-at-onset[40] which the present study did not explore.

Limitations

This study used a cross-sectional design with convenience sampling; therefore, generalization was limited. Next, the power to recognize cause and effect among variables was restricted, and also the findings might be affected by self-reporting of the frequency of diabetes self-management, even though dementia screening was conducted. Besides, internal consistency for the SDSCA-Thai version was rather low (Cronbach' $\alpha = .65$), and test-retest reliability was not conducted. A primary purpose was to test the influence among multi-level factors on diabetes self-management; testing interactions among process, person, context, and time (the PPCT model) could be conducted in further research. Since the predictive power was 14.7%, additional variables, such as self-efficacy, could be tested prior to intervention development.

Conclusions and Implications for Nursing Practice

Predictors of diabetes self-management in older Thai adults with poorly controlled T2DM were personal factors, including health literacy, abdominal obesity, time since diagnosis, and gender, suggesting approaches to promote diabetes self-management among them. For implications in nursing practice, nurses should monitor and integrate health literacy into diabetes self-management education through health literacy assessment as baseline information prior to providing education as appropriate for people. Older males with poorly controlled T2DM should be a target to promote health behavior modification toward diabetes self-management. Further studies investigating the causal relationships of factors influencing diabetes self-management should be conducted prior to designing an intervention for older adults with poorly controlled T2DM.

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ปัจจัยทำนายการจัดการตนเองเรื่องเบาหวานในผู้สูงอายุที่เป็นเบาหวานชนิดที่ 2 ที่ควบคุมเบาหวานได้ไม่ดี

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บทคัดย่อ: ผู้สูงอายุที่เป็นเบาหวานที่ควบคุมไม่ดีมีเพิ่มขึ้นเนื่องจากเป็นปรากฏการณ์ที่ซับซ้อน การจัดการตนเองอย่างมีประสิทธิภาพต้องอาศัยปัจจัยต่างๆเพื่อนำไปสู่ผลลัพธ์ที่ดี การศึกษาเชิงความสัมพันธ์นี้มีวัตถุประสงค์เพื่อทดสอบอิทธิพลปัจจัยเชิงนิเวศวิทยา (เพศ ระยะเวลาเป็นเบาหวาน ประวัติเบาหวานชนิดที่ 2 ภาวะอ้วนลงพุง ภาวะแทรกซ้อนจากเบาหวาน ความรอบรู้ด้านสุขภาพ เครือข่ายทางสังคม และการสนับสนุนทางสังคม) ต่อการจัดการตนเองเรื่องเบาหวาน ตัวอย่างผู้สูงอายุที่เป็นเบาหวานที่ควบคุมได้ไม่ดี จำนวน 166 ราย จากโรงพยาบาล 2 แห่งในภาคกลาง เลือกแบบเฉพาะเจาะจง เก็บรวบรวมข้อมูลด้วยแบบประเมินความรอบรู้ด้านสุขภาพ แบบวัดกิจกรรมการดูแลตนเอง แบบประเมินเครือข่ายทางสังคม และแบบประเมินภาวะแทรกซ้อนจากเบาหวาน การประเมินทางโภชนาการด้วยเส้นรอบเอวและระดับน้ำตาลสะสม วิเคราะห์ข้อมูลด้วยสถิติบรรยายและการวิเคราะห์ถดถอยพหุคูณหลายตัวแปร ผลการศึกษาพบว่า ความรอบรู้ด้านสุขภาพ ภาวะอ้วนลงพุง ระยะเวลาเป็นเบาหวาน และเพศร่วมกันทำนายการจัดการตนเองได้ร้อยละ 14.7 จำเป็นต้องมีการศึกษาปัจจัยเชิงสาเหตุอื่นที่เฉพาะเจาะจงยิ่งขึ้น เช่น ความเชื่อมั่นแห่งตนที่มีผลต่อการปรับเปลี่ยนพฤติกรรม อย่างไรก็ตาม ผลการศึกษาครั้งนี้มีข้อเสนอแนะสำหรับพยาบาลในการส่งเสริมการจัดการตนเอง ประกอบด้วย การส่งเสริมความรอบรู้ด้านสุขภาพ การปรับเปลี่ยนพฤติกรรมสุขภาพเพื่อควบคุมภาวะอ้วนลงพุงตามสภาวะสุขภาพ โดยเฉพาะในผู้สูงอายุเพศชายที่เป็นเบาหวานชนิดที่ 2

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คำสำคัญ: ความรอบรู้ด้านสุขภาพ ผู้สูงอายุ ควบคุมได้ไม่ดี การจัดการตนเอง ประเทศไทย เบาหวานชนิดที่ 2

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