

Path Analysis of the Influence of Nurses Role on Family Caregiver Diabetes Self-Management Capabilities with Empowerment as Intervening Variables in Indonesia

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Abstract

Introduction: Nurses have a responsibility to empower the family that is a preventive promotion effort to improve the ability of the family caregiver to manage diabetes. The purpose of this study was to analyze the role of nurses on the ability of family caregivers through family caregiver empowerment. **Methods:** This study was an analytic observational study with a cross-sectional design. This study was conducted in the Jember Regency, East Java Province of Indonesia, with a sample size of 150 respondents using a multi-stage random sampling technique. The instrument were namely the Role of the Nurse Perception Questionnaire, Psychological Empowerment Scale, and Diabetes Management Self Efficacy Scale. The data analysis used descriptive analysis and inferential analysis with Structural Equation Modeling-Partial Least Square (SEM-PLS). **Results:** The results showed that nurse's role had a direct effect on family caregiver empowerment by 93.80% ($t = 89.558$; $p = 0.000 < 0.005$), but did not have a direct effect on the diabetes self-management capabilities ($t = 0.508$; $p = 0,600 > 0,005$). However, nurse's role has an indirect effect on the diabetes self-management capabilities through family caregiver empowerment of 64.50% ($t = 4.036$; $p = 0,000 < 0.005$). This path analysis model is fit model and has an accurate predictive relevance to the existing constructor has a relevant ability to predict (SRMR Value = $0.053 < 0.8$; $Q^2 = 0.331 > 0$). **Conclusion:** The nurse's role has a direct influence on family caregiver empowerment and has an indirect effect on the diabetes self-management capabilities through family caregiver empowerment. The efforts to empower family caregivers by nurses through enabling, reinforcing, and supporting as a preventive-promotion intervention need to be improved to enhance the ability of family caregivers in type 2 diabetes management.

Keywords: *Diabetes Self-Management Capabilities; Family Caregiver Empowerment; Nurse's Role; Type 2 diabetes.*

Introduction

Degenerative diseases still cause various problems in various countries. One of the many degenerative diseases suffered is Diabetes Mellitus [1]. Type 2 diabetes mellitus (T2DM) is a chronic metabolic disease that requires medical management and ongoing independent management of patients and beneficial collaboration with families and health care professionals [2, 3].

The family, as the primary source of support for people with T2DM, plays an essential role in successful disease management. Family as a family caregiver can help people with T2DM in health-related care in daily living [2, 4]. Families can do diabetes self-management includes helping people with T2DM to manage their diets, physical

activities, medication management, monitoring, and checking blood sugar levels regularly and foot care. However, not all families can play a role as a family caregiver so that it can lead to the failure of self-management [3]. So that will affect the ability of people with T2DM to perform self-care and have an impact on the health status [2, 3, 5].

Family empowerment as a family caregiver is intended for families to play an active role in independent management. The purpose of these actions is for families to make decisions, manage resources, and work together with others so that they can have self-control, critical awareness, and show participatory behavior in health management

[6]. Failure to empower family caregivers can result in decreased self-care abilities of people with T2DM, reduced health status of patients as evidenced by abnormal health status, increased disease complications that trigger cardiovascular disease, nephropathy, retinopathy, and neuropathy and diabetic foot [2, 3, 5]. It also can cause an increase in care in health care institutions that have an impact on increasing the cost of care [3, 7], decreased quality of life [7]. Another impact is that it can cause a decrease in life expectancy and increase mortality due to diabetes [8]. The family's perception of the role of nurses influenced family empowerment as a family caregiver [9, 10].

The results of the study stated that nurses are the most influential factor in family empowerment in providing care to family members [11]. Family caregivers need support, assistance, and understanding from their family and friends and from the health care system in dealing with mental stress and high workload in caring for chronically ill family members [9].

Nurses in carrying out their role in caring for sufferers of chronic diseases have a role as educators by providing education and support to family caregivers so that they feel empowered and can care for family members [12]. Nurses can carry out a series of activities that enable families to take care actions, strengthen family health behaviors, and provide support as an effort to increase the ability of family caregiver through providing appropriate information, support, and health services [4, 9, 12].

Study-related to empowerment as an intervening variable between the role of nurses and the ability to manage diabetes independently as the researchers' knowledge has never been done before. Therefore, in this study, the researcher intends to conduct a study to analyze the influence of nurse's role on diabetes self-management capabilities with family caregiver empowerment as an intervening variable.

Materials and Methods

This study is an observational analytic study with a cross-sectional design. This study was conducted for two months (November - December 2019) in Ten Public Health Center in Jember district, East Java Province. The sample size was calculated by using the rule

of thumb formula, i.e., the number of parameters is five teen parameters multiplied by $5-10 = 150$ respondents. Samples were randomly selected using a multistage random sampling method. Inclusion criteria were life partner or adult children of people with T2DM, living together with people with T2DM, minimum of 1-year diabetes duration, and having health insurance. There are three variables in this study, namely the nurse's role as an independent variable, the diabetes self-management capabilities as the dependent variable, and the family caregiver empowerment variable as an intervening variable.

Data collection in this study was conducted using several questionnaires, namely family caregiver demographics, perception of the nurse's role, empowerment, and diabetes self-management capabilities. The nurse's role questionnaire was adapted from the concept of the nurse's role in empowering family caregivers (Imanigoghary et al., 2017). This questionnaire consisted of 24 items with a Likert scale 1-4, validity ($r = 0.432 - 0.792$) and reliability (Cronbach's $\alpha = 0.916$).

The family caregiver empowerment questionnaire was adapted from the Psychological Empowerment Scale [13]. This questionnaire consisted of 30 items with a Likert scale 1-5, validity ($r = 0.384 - 0.933$) and reliability (Cronbach's $\alpha = 0.981$). While the diabetes self-management ability questionnaire was adapted from the Diabetes Management Self Efficacy Scale (van der Bijl et al., 2001). This questionnaire consisted of 20 items with a Likert scale of 1-5, validity ($r = 0.425 - 0.839$) and reliability (Cronbach's $\alpha = 0.752$). Data were analyzed with descriptive and statistical analyses.

Descriptive analysis was done by describing the data according to the type of data. Numerical data were described in central tendency (mean and standard deviation), while categorical data were described in the frequency distributions.

Statistical analysis was conducted to examine the effect of the nurse's role variables on family caregiver empowerment by using a path analysis test with software SmartPLS v3. This study is part of the study of the family caregiver empowerment model and passed the ethical review of the Health

Research Ethics Commission of the Faculty of Nursing at Airlangga University.

Results

Respondent Characteristics

Based on table 1, it can be seen that the average age of respondents is 46.13 years with the majority female (61.30%), high

school education level (35.30%), income level less than UMR (64%). Also, the majority of respondents have marital status married (88%) and have a kinship as a child (43.30%). Based on table 2, it can be seen that the majority of respondents have a perception of the nurse's role in the high category (50.70%) with an average score of 72.13.

Table 1: Distribution of Characteristics of Respondents by Age, Gender, Education Level, Income Level, Marital Status, and Kinship with Type 2 DM Patients in Jember Regency in October-December 2019 (n=150)

Characteristics	n	%	Mean	Min – Max.	SD
Age (years)			46.133	24-70	13.54816
Gender					
Female	92	61.30			
Male	58	38.7			
Education Level					
No School	14	9.30			
Elementary School	44	29.30			
Junior High School	22	14.70			
Senior High School	53	35.30			
College	17	11.30			
Income Level					
Under Minimum Wage	96	64.00			
Above Minimum Wage	54	36.00			
Marital Status					
Married	132	88.00			
Unmarried	13	7.30			
Widow/Widower	7	4.70			
Kinship					
Children	65	43.30			
Husband	44	29.30			
Wife	36	24.00			
Other	5	3.30			

Table 2: Distribution of Respondents Based on Nurse's Role, Family Caregiver Empowerment, and Diabetes Self-Management Capabilities in Jember Regency in October - December 2019 (n = 150)

No	Variable	n	%	Mean±SD (Min-Maks)	Gender	Education Level	Income Level	Marital Status	Kinship
					p-Value	p-Value	p-Value	p-Value	p-Value
1	Nurse's Role			72,13±6,66622 (60-85)	0,797	0,806	0,003	0,278	0,358
	Low	0	0						
	Medium	74	49,30						
	High	76	50,70						
	Sub variable								
	Enabling			28,26±2,27455	0,888	0,730	0,030	0,264	0,357
	Reinforcing			23,67±2,38470	0,709	0,847	0,001	0,350	0,391
	Supporting			20,19±2,38470	0,897	0,690	0,004	0,183	0,398
2	Family Caregiver Empowerment			111,03±13,74013 (80-135)	0,776	0,844	0,003	0,226	0,218
	Low	0	0						

	Medium	66	44,00						
	High	84	56,00						
	Sub variable								
	Domination			31,47±3,48856	0,316	0,822	0,005	0,251	0,095
	Participation			20,67±3,68138	0,328	0,636	0,001	0,070	0,166
	Challenge			29,53±3,65215	0,871	0,950	0,009	0,340	0,255
	Collaboration			29,67±3,82493	0,860	0,932	0,019	0,201	0,319
	Diabetes Self-Management Capabilities			78,72±8,37391 (52-100)	0,622	0,867	0,018	0,175	0,447
	Low	0	0						
	Medium	40	26,70						
3	High	110	73,30						
	Sub variable								
	Healthy diet			40,66±4,5986	0,619	0,851	0,023	0,356	0,740
	Physical activity			12,09±1,47433	0,499	0,653	0,400	0,741	0,282
	Drug management			12,21±1,62322	0,538	0,549	0,028	0,058	0,200
	Self blood sugar check			11,21±1,76581	0,107	0,601	0,217	0,647	0,696
	Foot care			2,41±1,37620	0,357	0,954	0,898	0,282	0,953

Based on Table 2 it is also known that there is a significant difference in the value of the perception of the nurse's role ($p=0.003<0.005$), family caregiver empowerment ($p=0.003<0.005$), and the diabetes self-management capabilities ($p=0.018<0.05$) based on income. Respondents who have an income level above minimum wage show a better perception of the nurse's role compared to respondents who have an income under minimum wage (74,247>70,947). Also, family caregiver empowerment for respondents with income level above minimum wage shows better value compared to respondents who have income under minimum wage (115.444>108.5417). Diabetes self-management capabilities for respondents with income level above minimum wage looks better compared to respondents who have income under minimum wage, especially on a healthy diet (41.7593> 40.0417) and drug management (12.5926>11.9896)

Outer Model

Analysis of the outer model or measurement model was done by testing the validity and

reliability of the facts by using the indicator reliability test, internal reliability consistency test, convergent validity test, and discriminant validity test.

Table 3: Results of Indicator Reliability and Internal Reliability Consistency Test

No	Variable	Indicator	Loading Factor	Composite Reliability	Cronbach alpha	AVE
1	Nurse's Role	X1. Enabling	0,945	0,964	0,950	0,870
		X2. Reinforcing	0,970			
		X3. Supporting	0,948			
2	Family Caregiver Empowerment	Y1. Domination	0,945	0,870	0,812	0,573
		Y2. Participation	0,904			
		Y3. Challenge	0,936			
		Y4. Collaboration	0,944			
3	Diabetes Self-Management Capabilities	Z1. Healthy diet	0,817	0,968	0,951	0,911
		Z2. Physical activity	0,701			
		Z3. Drug management	0,664			
		Z4. Self blood sugar check	0,798			
		Z5. Foot care	0,794			

Table 4: Results of Discriminant Validity Test with Cross Loading Value

No	Indicator	Nurse's Role	Family Caregiver Empowerment	Diabetes Self-Management Capabilities
1	X1. Enabling	0,945	0,833	0,704
2	X2. Reinforcing	0,970	0,918	0,725
3	X3. Supporting	0,948	0,873	0,682
4	Y1. Domination	0,875	0,945	0,701
5	Y2. Participation	0,858	0,904	0,713
6	Y3. Challenge	0,868	0,936	0,727
7	Y4. Collaboration	0,898	0,944	0,748
8	Z1. Healthy diet	0,615	0,690	0,817
9	Z2. Physical activity	0,533	0,568	0,707
10	Z3. Drug management	0,491	0,484	0,664
11	Z4. Self blood sugar check	0,521	0,556	0,798
12	Z5. Foot care	0,617	0,608	0,794

Based on Table 3, it can be seen that the loading factor of all indicators > 0.5, it can be concluded that the indicators of the nurse's role, empowerment and self-management indicators are reliable indicators of variable measurement. The value of Average Variance Extracted (AVE) > 0.5, Cronbach's alpha > 0.7, and composite reliability > 0.6 indicate that the indicators on the variables are reliable and valid. Based on table 4, it is known that all indicators have a loading factor value with a constructed variable greater than the other variables. It is shown that the reflective indicator on each variable is a good measure of the construct and has good discriminant validity against other variables

Inner Model

Analysis of inner model or structural model testing was done by evaluating several criteria namely the value and significance of

the coefficient of determination (R^2), cross-validated redundancy (Q^2), effect size (F^2), and path coefficient (path coefficient), and Standardized Root Mean Square Residual (SRMR).

Table 5. Result of R Square and Cross-Validate Redundancy (Q^2) Test

Variable	R^2	R^2 Adjusted	Q^2 (=1-SSE/SSO)
Family Caregiver Empowerment	0,879	0,879	0,758
Diabetes Self-Management Capabilities	0,601	0,596	0,331

Based on table 5, it can be seen that the nurse's role factor can explain the family caregiver empowerment factor of 87.90% ($R^2=0.879>0.75$) categorized as very strong. The nurse's role factor, together with the empowerment factor, can explain the independent management ability factor of 60.10% and is categorized strong ($0.50>R^2=0.601>0.75$). Also, based on the value of Q^2 for each construct > 0 . It is shown that the model formed has an accurate predictive relevance to the existing constructor and has a relevant ability to predict

Table 6: Result of F Square and Path Coefficient Test

No	Variable	F Square		Path Coefficient		SRMR
		Family Caregiver Empowerment	Diabetes Self-Management Capabilities	Family Caregiver Empowerment	Diabetes Self-Management Capabilities	
1	Nurse's Role	7,925	0,003	0,938	0,093	0,053
2	Family Caregiver Empowerment		0,153		0,688	

Based on table 6, it can be seen that the nurse's role factor had a significant contribution to the value of the coefficient of determination of family caregiver empowerment factors ($F^2=7.925>0.35$) and had a positive influence of 93.80%. However, the role of nurses had a small contribution to the value of the coefficient of determination of the factor of the ability of independent management ($F^2=0.003 < 0.02$) and only had a positive effect of 9.3%. Based on table 6, it is mean the family caregiver empowerment factor had a significant contribution to the value of the coefficient of determination of the factor of self-management ability ($0.02 < F^2 = 0.153 < 0.35$) and had a positive effect of 68.80%. The model is said to be a fit model if the SRMR value < 0.08 . Based on the results of the SMRS values in table 6, it can be seen that the SRMR value = $0.053 < 0.8$, it can be said that this model is fit

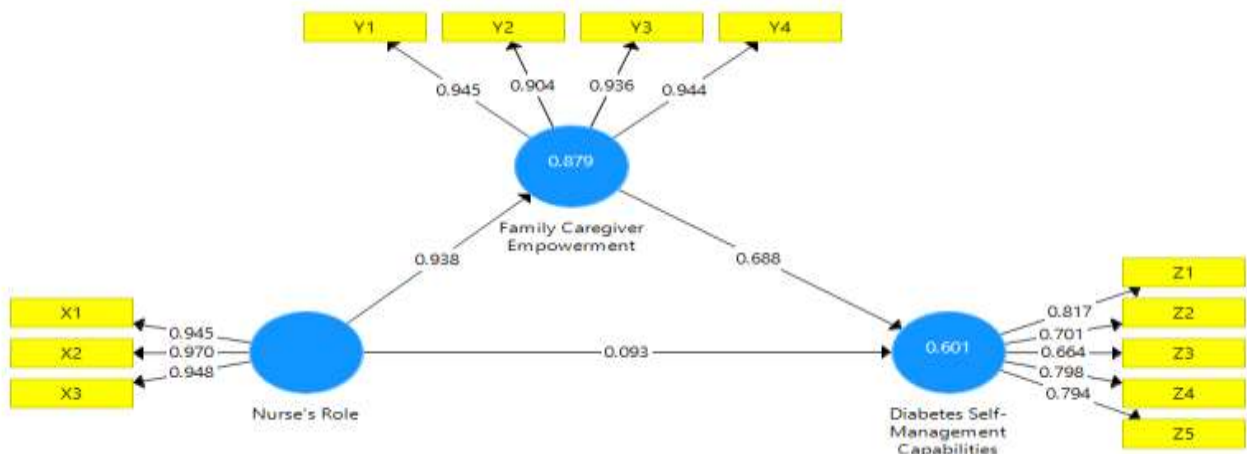


Figure 1: SEM-PLS Fit Model: loading factor value and path factor coefficient

Hypothesis Testing

The influence and the relationship between exogenous factors and endogenous factors

were done by analyzing the influence path between the relationship factors, where the path of influence can be either a direct influence or an indirect effect.

Table 7. Results Analysis of Direct Influence Pathways and Indirect Effects of Exogenous Factors on Endogenous Factors Test

No	Variable	Path Coefficient	SD	T Statistik	p-Value
1	Nurse's Role → Family Caregiver Empowerment	0,938	0,010	89,558	0,000
2	Nurse's Role → Diabetes Self-Management Capabilities	0,093	0,183	0,508	0,611
3	Family Caregiver Empowerment → Diabetes Self-Management Capabilities	0,688	0,170	4,044	0,000
4	Nurse's Role → Family Caregiver Empowerment → Diabetes Self-Management Capabilities	0,645	0,160	4,036	0,000

Based on table 7, it can be seen that the nurse's role had a direct influence on the family caregiver empowerment ($t = 89.558$; $p = 0.000 < 0.005$) but doesn't had a direct influence on the diabetes self-management capabilities ($t = 0.508$; $p = 0.611 > 0.005$). However, the role of nurses had an indirect effect on diabetes self-management capabilities through family caregiver empowerment ($t = 4.036$; $p = 0.000 < 0.005$) of 64.50%

Discussion

Influence of the Nurse's Role on Family Caregiver Empowerment

The results of the study, as shown in Table 2, showed that the majority of respondents had a perception of the role of nurses in the high category. However, if we look at the sub-variables, it can be seen that only the enabling sub-variables have a high category while other sub-variables (reinforcing and supporting) were in the medium category.

It is shown that among the three roles of nurses performed in health services, the family feels that the nurse has given enough information related to the disease and its management, but less reinforcement and support for decision making and actions taken by the family. Also, based on table 2, it can be seen that the majority of respondents have the perception of empowerment in the high category.

However, the participation sub-variable shows that the majority of respondents have a medium category. It is shown that the average respondent did not participate optimally in the process of independent management of people with type 2 diabetes. The results of the study, as listed in table 6 and table 7, show that the nurse's role has a strong influence on empowering family caregivers.

Therefore the role of nurses must be strengthened to be able to increase family caregiver empowerment. Nurses need to enhance their role in terms of enabling, reinforcing, and supporting the family caregiver. It is due to the condition of chronic diseases causing an increase in need of family caregivers for a proper understanding of the disease process and the treatment process and specific exercises needed to perform treatments to prevent complications in sufferers and negative impacts on themselves [9, 12]. The enabling nurse's act facilitates allowing the family to be able to carry out specific actions to promote health.

Nurses must be able to assist the needs of the family caregiver to enable them to take appropriate steps through providing accurate and complete information about the condition of health problems or diseases faced by family members and their management [4, 9].

Nurses must take reinforcing actions, namely strengthening family health promotion behaviors that support sufferers' health by recognizing and increasing family competence [9]. Health promotion behaviors can be enhanced by identifying family capabilities and providing information about what actions families must take, correcting inappropriate actions reinforcing appropriate actions by giving positive feedback through a series of participatory discussions. Health knowledge as a basis for their behavior will be obtained in greater depth to strengthen the actions taken [14].

Nurses, to empower families, are expected to be able to support by providing support to families taking appropriate health promotion. Also, by facilitating the needs needed to strengthen planned health promotion behaviors, improve family care management capabilities, promote empathy and show genuine concern, and build direct relationships with sick family members [9, 14].

Nurses also can play the role of supporting agents to improve family coping mechanisms in the care of family members, namely providing appropriate health services and providing access to skilled health centers, and referrals to other supporting organizations as needed [12]. Attitudes, subjective norms, and perceived behavioral control are strongly influence intention of nurses to carry out diabetes education [15]. It is mean it is essential for nurses to understand their role as a nurse so that they can play their role as they should in providing services to people with type 2 diabetes mellitus and their families.

Influence of the Nurse's Role on Diabetes Self-Management Capabilities

The results of the study, as listed in table 2, show that the majority of respondents have diabetes self-management in the medium and high categories. It is shown that the majority of respondents already can conduct independent management of type 2 DM properly.

Based on table 2, it is also known that there were significant differences in diabetes self-management based on the respondents' income level.

It is likely due to the limited economic resources owned by the family, which causes them to experience obstacles in managing diabetes independently, especially in the ability to regulate diet and medication management. Socioeconomic status contributes to caring in the family. Variations in socioeconomic status affect the role of the family caregiver, especially in long-term care.

Limited economic resources will affect access to health services that have an impact on decreasing the ability of self-care [7, 16]. The role of nurses in providing education should pay attention to the sociodemographic aspects of education recipients. The socio-demographic conditions, such as socioeconomic status, are related to the ability of a family caregiver to provide appropriate care for people with type 2 diabetes [17].

Therefore, the right strategy by paying attention to sociodemographic aspects is expected to be able to increase the ability of family caregiver as a result of study programs that are tailored to the specific conditions can improve diet adherence to promote a healthy diet for people with T2DM [18]. Besides, the results of the study showed that psychosocial factors, such as knowledge, motivation, coping, contributed to the ability of family caregivers [17].

Therefore the role of nurses in empowerment, in addition to paying attention to sociodemographic aspects, must also pay attention to the psychosocial aspects of the family caregiver so that an appropriate empowerment strategy can be carried out and achieve the goals of empowerment. The results of the study, as listed in table 7 show that the role of nurses does not have a significant direct effect on the ability of independent management of diabetes, but is having an indirect impact through empowerment.

It is shown that the importance of empowering family caregivers is done by nurses to improve the ability of family caregivers. The role of partnerships between families and health care professionals it is essential in efforts to manage chronic diseases [4, 19]. The family must be the primary decision-maker and manager of health issues that affect the welfare of their family life [9].

Families need to get access to health information resources so nurses must expand their role by providing health education aimed at self-care and family empowerment. Nurses play an effective role by providing support in improving family welfare as a caregiver by providing information, support, and services to meet those needs [9].

Providing information about diseases, training on problem-solving and appropriate care skills, assistance and consultation during the treatment period, ongoing follow-up from the patient and family caregiver's condition, and provide psychological services and support for the patient's family (Imanigohary et al., 2017).

Influence of the Nurse's Role on Diabetes Self-Management Capabilities through the Empowerment as Intervening Variable

The results of the study, as listed in table 7, show that the role of nurses has a significant influence on diabetes self-management capabilities through empowerment. It is shown that empowerment is a key factor that must be managed well by nurses so that family caregivers can manage the disease properly. However, family caregivers in treating chronic disease sufferers will face mental stress and high workload. The family caregiver needs support, assistance, and understanding from the surrounding environment and also from the health care system [9, 14].

Providing diabetes self-management education and ongoing support from nurses can increase knowledge, motivation, social and family support, motivation [20], which is closely related to diabetes self-management capability, prevent complications, improve health status and quality of life of people with type 2 diabetes mellitus [17].

Family support given in the form of informational, emotional, facilitative, and instrumental has a strong influence on the people with T2DM to maintain good diabetes self-management [21]. Family support also a strong predictor of one's motivation, which will have an impact on patient compliance and family caregiver in carrying out treatment regimens [22]. It is, therefore, important for nurses to be able to improve family competence so that they can also play a proactive role in diabetes care.

Nurses in carrying out their role in caring for patients with chronic diseases have a role as clinicians, educators, counselors, and researchers, including providing education and support to family caregivers to have the ability to care for family members (Grant & Ferrell, 2012). The educator role is categorized into two categories, namely: teach to accept care and teach provide safe care. Forms of action that can be done by nurses are to provide complete information about the disease and provide teaching about problem-solving skills, teach to provide safe care, Forms of action that can be done by nurses is to provide safe care for people with T2DM and provide safe care for caregivers [9, 12].

Empowerment of family caregivers can provide positive control of one's mind and body, positive attitudes, proactively seek to understand one's role as caregiver, support the independence of care recipients, and create constructive relationships with people others around it [23]. Empowerment could improve the quality of life and meaning of life, increase autonomy and control, and reduce stress in the family [24], and improve family coping skills. The caregiving process for sick family members can also increase satisfaction as a caregiver [4].

Based on the literature review, there are five main areas of impact of empowerment strategies in improving outcomes related to individual health, namely increased self-efficacy and self-esteem, a greater sense of control, increased knowledge and awareness, behavioral change, and a greater sense of community in the form of social networks, broader and higher social support [25].

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Health education, based on self-efficacy, can improve the ability of independent management [26]. Failure to empower is related to the inability to detect health problems, and coping with health problems, limited involvement in health management planning, decreased willingness to participate in health care. Failure empowerment also can make low compliance with treatment regimens and increased risk of non-compliance to access appropriate care that will have an impact on progressively more increasing health costs and decreasing patient health status [14].

Conclusion

The role of nurses influenced the empowerment of family caregivers, and family caregiver empowerment influenced on type 2 diabetes self-management capabilities. The role of nurses has no direct influence on the type 2 diabetes self-management capabilities but has an indirect effect on independent management of type 2 DM through intervening empowerment variables. The results of this study suggest to health care professionals to increase preventive and health promotion efforts for family caregivers to improve diabetes management.

Empowering, as a preventive and health promotion effort, can enhance the ability of the family caregiver to perform diabetes self-management. The goals are to improve the health status of patients, prevent complications of the disease, and improve the health-related quality of life of people with T2DM.

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