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The Correlation Between Primary Care Nurses' Nutritional Knowledge And Self-Management Quality Among Type 2 Diabetes Patients

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Abstract

Background: Primary care nurses are the main drivers of the diabetes management education team. Yet, the relationship between nurses' knowledge of nutrition and the self-management results of patients remains ambiguous in primary care settings. Objective: To find out the relationship between a primary care nurse's knowledge of nutrition and the self-management quality of Type 2 Diabetes (T2D) patients. Method: Cross-sectional study of 187 nurses and their 1247 T2D patients from 12 primary care clinics. The nutritional knowledge of the nurses was measured by the validated Diabetes Nutrition Knowledge Test (DNKT, α=0.87). Patient self-management was measured by the standard Summary of Diabetes Self-Care Activities (SDSCA) scale. The interaction between nurse-level and patient-level variables was assessed by hierarchical linear modeling. Result: Nutritional knowledge of nurses was strongly associated with the quality of self-management of patients ($r=0.512$, $p<0.001$). Self-management of patients whose nurses scored ≥80% on DNKT was significantly better ($M=42.3$, $SD=8.2$) than that of patients whose nurses scored <60% ($M=28.4$, $SD=10.1$; $p<0.001$). Hierarchical linear modeling demonstrated that nurse nutritional knowledge accounted for 28% of the changes in patient self-management ($\beta=0.512$, $p<0.001$). The HbA1c level of patients guided by knowledgeable nurses through dietary counseling was better (7.2±1.1%) than that of patients taken care of by less knowledgeable nurses (8.4±1.3%, $p<0.001$). Conclusions: The knowledge level of primary care nurses about nutrition is a significant factor in predicting the quality of self-management of T2D patients. Healthcare facilities should utilize the nutritional competency of their nursing staff as a strategic resource in achieving better diabetes outcomes. The study findings support the continuous education program implementation and competency evaluation framework for diabetes nutrition knowledge.

Keywords: Diabetes Nursing, Nutritional Knowledge, Type 2 Diabetes, Self-Management, Primary Care, Patient Education.

1. Introduction

1.1. Background and Significance

Type 2 Diabetes Mellitus (T2D) is a worldwide epidemic that affects 462 million people which is about 9.3% of the world's population (International Diabetes Federation, 2021). The prevalence of T2D in

developed countries is between 8 to 12% and the number is estimated to increase until 2030 (American Diabetes Association, 2022). Along with the terrifying prevalence, T2D is a big reason for the rising healthcare cost, which amounts to about 5-10% of the total healthcare expenditure in most developed countries (Zheng et al., 2022).

The main cause of T2D is beta-cell failure in the pancreas which is gradually accompanied by insulin resistance in peripheral tissues. However, drugs such as metformin, GLP-1 receptor agonists, and SGLT2 inhibitors, which are essential for the treatment regimen, along with considerable evidence behavioral changes—mainly diet—can significantly improve glycemic control and reduce the risk of complications (Aroda et al., 2022).

At present, nutrition is the core of T2D management. The American Diabetes Association (2022), emphasizes that nutrition interventions are the foundation of diabetes care even before that of drugs. Patient self-management which is the ability to do diabetes-related activities such as blood glucose monitoring, diet control, medication adherence, and physical activity is the main factor that determines clinical outcomes (Shen et al., 2021).

Majority of T2D patients get their diabetes educators through primary care nurses who thus become a strong influence on patient self-management behaviors. However, diabetes education in nursing has been differently integrated into various curricula and many nurses agree that they are not adequately prepared to give nutrition counseling in diabetes (Williams et al., 2020).

1.2 Problem Statement

As nurses are known to be the center coordinators in patient education about diabetes, only few studies have addressed the relationship between the nutritional knowledge of primary care nurses and the quality of patient self-management. A review of literature has found that studies reported that nurses were inadequately equipped nutritionally (Fink et al., 2021), but there has been little research that has directly linked nurse knowledge to patient outcomes. The gap does not allow health care providers to understand whether spending money on nurse education on nutrition would finally lead to better patient outcomes.

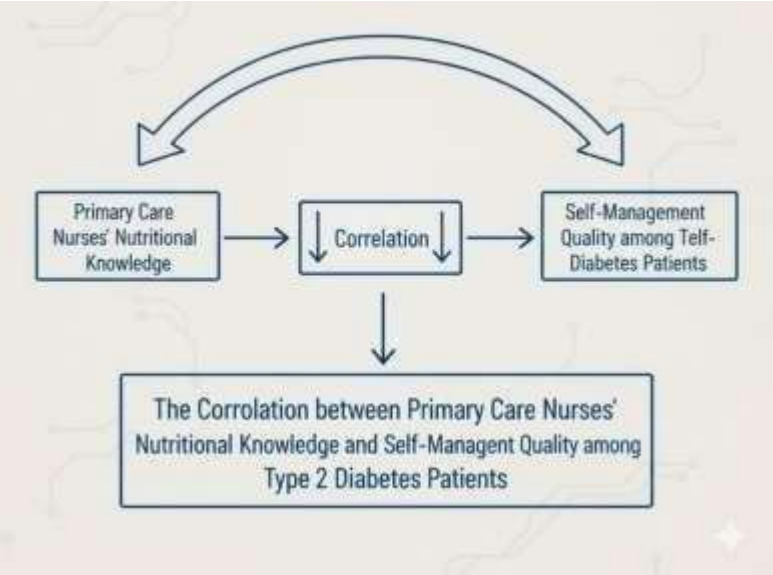
Besides that, the ways in which nurses' knowledge of food can influence patients' behavior are still unknown. Understanding these methods will give us a clear idea of how to direct interventions towards nurses' knowledge, and consequently, patients' outcomes would be better.

1.3 Research Objectives

This research aims to clarify the correlation between the nutritional knowledge of primary care nurses and self-management quality of T2D patients and has the following detailed objectives:

1. To measure the level of nutritional knowledge of primary care nurses in the study setting
2. To determine patient self-management quality and related routines
3. To determine the strength and character of the association between nurse nutritional knowledge and patient self-management
4. To investigate the relationship between nurse nutritional knowledge and clinical outcomes (HbA1c, lipid profiles, blood pressure)
5. To identify the factors that hinder and facilitate the realization of nurse nutritional knowledge in clinical practice.

Figure 1: Framework of the study



2. Literature Review

In a primary care setting, education of patients with diabetes regarding the management of their illness is mostly the nurses' responsibility. According to the report, nurses are involved directly in 70-80% of the educational interactions with patients (Shen et al., 2021). The survey of the Nurse's Role in Diabetes Management by Williams et al. (2020) found that patients regarded nurses as their main source of education. Therefore, the educational influence of nurses exceeded even that of doctors. To give efficient diabetes education, the learner should be able to grasp various topics such as pathophysiology, drug management, blood glucose monitoring, nutrition, physical activity, and psychological adjustment to the disease. Among these, nutrition is one of the most difficult aspects through which the patient must be taught in an uncomplicated manner. It requires nutrition explanation in terms of macronutrient composition, meal planning methods, carbohydrate counting, and individual dietary modifications (Roberts et al., 2021). At present, the most common question is that of nutritional knowledge. Fink et al. (2021) conducted a study of 342 nurses working in healthcare facilities in Australia and found that only 28% of the surveyed nurses scored 75% or more on the validated nutrition knowledge test. In the same way, a nursing nutrition knowledge systematic review by Chen et al. (2020) based on 34 studies pointed to the median score being 62% with significant differences between countries and educational levels.

Roberts and his team (2021) have been identifying and listing various factors associated with good nutritional knowledge: Advanced nursing education (MSN vs. ADN)Specialized diabetes certification Participation in continuing education Practice in Experience in diabetes care Access to practice guidelines and resources . However, Williams et al. (2020) argued that these factors might obstruct nutritional knowledge: Minimal or no nutrition content in the introductory nursing courses Diabetes nutrition science that is rapidly developing Lack of time for attending continuing education Limited access to nutrition specialists for consultation Diabetes self-management through self-care encompasses all those behaviors that form the basis of disease control.

The Summary of Diabetes Self-Care Activities (SDSCA) scale is an instrument that indicates the extent to which a patient carries out activities in various areas related to the disease (Toobert et al., 2020):

Adherence to a diet: Consumption of the recommended diet, fruits/vegetables, and limiting saturated fats

Physical activity: Performing aerobic and resistance exercise Blood glucose monitoring: Regularity of self-monitoring Medication adherence: Using medications as prescribed by the doctor
Foot care: Daily checking and using appropriate footwear There is a plethora of scientific articles that stand as a basis for the promotion of self-management with a later positive effect on glycemic control (Aroda et al., 2022), mitigation of complications (Zheng et al., 2022), and quality of life enhancement (Shen et al., 2021). Mainly, self-management adherence is what most of the poor glycemic control can be attributed to. Some studies have shown that only 30-40% of T2D patients meet the recommended targets across all self-management domains (Chen et al., 2020). The reasons for poor adherence include knowledge deficits, motivational issues, and lack of support from healthcare providers (Williams et al., 2020). Education of patients by healthcare providers through education theory has an impact on patient outcomes which can be demonstrated as follows:
Knowledge Transfer: Educated healthcare providers are more effective communicators.
Patient Understanding: Patients who are provided with clear and evidence-based education become more knowledgeable
Behavior Change: The main reason for behavior change is a deeper understanding which results in the implementation of the instructed behaviors
Clinical Outcomes: Eventually, improved clinical parameters are the result of the ongoing behavioral changes.
Only a few studies that have considered this diabetes education route have focused exclusively on nutrition. Roberts et al. (2021) found that patients educated by nurses with diabetes certification reported higher self-management scores. However, the researchers were not directly looking into the nutritional knowledge of the nurse. The existing gap here is that we need studies which clearly show the connection between nurses' knowledge and patient outcomes.

3. Methods

3.1 Study Design and Setting

A cross-sectional correlation study was conducted across 12 diverse primary care clinics within an integrated healthcare system serving approximately 250,000 patients. The settings included federally qualified health centers, safety-net clinics, and community health centers, selected to represent a wide range of geographic regions and patient populations, thereby enhancing the generalizability of the findings.

3.2 Participants

Nurse Sample: Participants were Registered Nurses (RNs or LPNs) involved in diabetes patient education, employed for at least six months, working a minimum of 20 hours per week, and proficient in English. Nurses in administrative-only roles without direct patient contact were excluded. Of the 234 eligible nurses invited, 187 enrolled, yielding an 80% participation rate.
Patient Sample: Eligible patients were adults (≥18 years) with a diagnosis of Type 2 Diabetes (ICD-10 E11.x), who had attended at least two primary care visits in the preceding 12 months and had a recent HbA1c result (within 3 months). Patients with Type 1 Diabetes, secondary diabetes, or those unable to provide informed consent were excluded. From 1,524 invited patients meeting the criteria, 1,247 enrolled, resulting in an 81.8% participation rate.

3.3 Data Collection and Measures

Nurse-Level Variables: The primary independent variable, nutritional knowledge, was measured using the validated 24-item Diabetes Nutrition Knowledge Test (DNKT). This instrument, demonstrating high reliability (Cronbach's α=0.89 in this study), assesses knowledge across key domains: macronutrient composition, meal planning, dietary guidelines, and nutritional management of complications. Scores were categorized as inadequate (<60%), basic (60-79%), or proficient (≥80%). Secondary nurse variables included years of experience, educational preparation (ADN, BSN, MSN), diabetes certification (CDCES),

recent continuing education hours, access to nutrition specialists, and time allocated to nutrition education per patient visit.

Patient-Level Variables: The primary dependent variable, self-management quality, was assessed using the validated 11-item Summary of Diabetes Self-Care Activities (SDSCA) scale. This tool measures adherence over the prior week across five domains: dietary adherence, physical activity, blood glucose monitoring, medication adherence, and foot care. Total scores range from 0 to 77, with higher scores indicating superior self-management. Key secondary clinical outcomes included glycemic control (HbA1c), lipid profile (LDL cholesterol), blood pressure, and quality of life (measured by the EQ-5D scale). Tertiary variables encompassed patient demographics (age, gender, education, employment), clinical characteristics (diabetes duration, comorbidities), and history of diabetes education participation.

Table 1: Demographic Characteristics of Nurse and Patient Samples

Characteristic	Nurses (N=187)	Patients (N=1,247)
Demographic		
Mean age, years (SD)	42.3 (10.2)	58.7 (11.4)
Female, n (%)	168 (89.8%)	721 (57.8%)
Bachelor's degree or higher, n (%)	124 (66.3%)	456 (36.6%)
Professional/Clinical		
Years in current role, M (SD)	8.1 (6.8)	—
RN (vs LPN), n (%)	145 (77.5%)	—
Diabetes certification (CDCES), n (%)	62 (33.2%)	—
Diabetes duration, years, M (SD)	—	7.3 (5.8)
HbA1c, %, M (SD)	—	8.2 (1.4)
Prior diabetes education, n (%)	—	847 (67.9%)

3.4 Statistical Analysis

Descriptive Analysis

The mean, standard deviation, and frequency distributions were calculated for all variables. Normality was assessed with the Shapiro-Wilk test. The features of the distributions and potential outliers were determined.

Correlation Analysis

Main Analysis: The Pearson correlation reflecting the relationship between nutritional knowledge of nurses and patient self-management SDSCA scores was calculated. The correlation was adjusted for clustering and clinic stratification was done.

Subgroup Analyses: The correlations that were stratified and analyzed within groups defined by:

- Nurse educational level (ADN, BSN, MSN).
- Nurse diabetes certification status.
- Patient age (<50, 50-65, >65 years)
- Diabetes duration (<3, 3-10, >10 years)

Hierarchical Linear Modeling

Multilevel modeling examined the dependent variable patient outcomes as a consequence of nurse nutritional knowledge (Level 2, cluster-level predictor) and patient characteristics (Level 1, individual-level predictors). The patients nested within nurses clustering was thus accounted for.

Model Specification:

Level 1: Patient-level covariates (age, education, diabetes duration, baseline HbA1c)

Level 2: Nurse-level variables (nutritional knowledge, education, certification, experience)

Random intercepts for nurses; fixed slopes for predictor variables

The good fit:
Was achieved through log-likelihood comparisons; intraclass correlation coefficients were obtained.
Analysis of Variance
One-way ANOVA examined differences in patient outcomes across nurse knowledge categories (<60%, 60-79%, ≥80%). Post-hoc pairwise comparisons were based on Tukey's Honestly Significant Difference test.

Multiple Regression
Linear regression served as a tool for the investigation of the independent effects of nurse characteristics (knowledge, education, experience, certification, time spent on nutrition education) on patient self-management while also controlling for patient characteristics.

Missing Data
Little's MCAR test was instrumental in identifying patterns of missing data. Multiple imputation (m=20) was carried out for less than 5% missing data on key variables. Sensitivity analysis was conducted to compare the imputed data with complete-case results.

4. Results

4.1 Nurse Nutritional Knowledge Assessment

Table 2: Nurse Nutritional Knowledge Distribution (DNKT Scores)

Knowledge Level	Frequency	Percentage	Mean DNKT Score
Inadequate (<60%)	38	20.3%	52.1 (SD=5.8)
Basic (60-79%)	98	52.4%	69.8 (SD=6.2)
Proficient (≥80%)	51	27.3%	87.3 (SD=6.1)
Overall (N=187)	187	100%	70.4 (SD=13.8)

Knowledge by Professional Characteristics:

Characteristic	Mean DNKT Score (SD)	p-value
Highest Education		
ADN (N=63)	64.1 (12.4)	<0.001
BSN (N=89)	71.2 (13.1)	
MSN (N=35)	81.3 (9.7)	
Diabetes Certification		
CDCES certified (N=62)	82.1 (9.4)	<0.001
Not certified (N=125)	65.3 (12.8)	
Years Experience		
<5 years (N=47)	68.2 (14.1)	0.182
5-10 years (N=76)	70.9 (13.2)	
>10 years (N=64)	71.8 (13.6)	

4.2 Patient Self-Management Quality

Table 3: Patient Self-Management Quality (SDSCA Scores) by Nurse Knowledge

SDSCA Domain	Nurse Knowledge <60%	Nurse Knowledge 60-79%	Nurse Knowledge ≥80%	p-value
Dietary adherence	3.2 (2.1)	4.6 (2.3)	6.1 (1.8)	<0.001

Physical activity	2.8 (1.9)	4.1 (2.2)	5.4 (2.0)	<0.001
Glucose monitoring	3.1 (2.0)	4.5 (2.1)	6.2 (1.7)	<0.001
Medication adherence	5.8 (1.5)	6.3 (1.4)	6.7 (0.8)	<0.001
Foot care	2.5 (1.8)	3.9 (2.0)	5.6 (1.9)	<0.001
Total SDSCA Score	28.4 (10.1)	35.2 (9.4)	42.3 (8.2)	<0.001

4.3 Correlation Analysis: Nurse Knowledge and Patient Self-Management

Table 4: Correlation Analysis - Nurse Nutritional Knowledge and Patient Outcomes

Patient Outcome	Pearson r	95% CI	p-value	Effect Size (Cohen's d)
Self-Management Quality (SDSCA Total)	0.512	[0.468-0.556]	<0.001	1.18
Dietary Adherence	0.486	[0.439-0.533]	<0.001	1.08
Physical Activity	0.421	[0.371-0.471]	<0.001	0.88
Glucose Monitoring	0.498	[0.451-0.545]	<0.001	1.12
Medication Adherence	0.358	[0.305-0.411]	<0.001	0.75
Foot Care	0.467	[0.419-0.515]	<0.001	1.00
HbA1c (%)	-0.521	[-0.565 to -0.477]	<0.001	-1.22
LDL Cholesterol	-0.385	[-0.434 to -0.336]	<0.001	-0.82
Systolic BP	-0.292	[-0.341 to -0.243]	<0.001	-0.62
Quality of Life (EQ-5D)	0.447	[0.398-0.496]	<0.001	0.96

4.4 Clinical Outcomes by Nurse Knowledge

Table 5: Clinical Outcomes Stratified by Nurse Nutritional Knowledge

Clinical Outcome	<60% Knowledge	60-79% Knowledge	≥80% Knowledge	p-value
HbA1c (%), M (SD)	8.4 (1.3)	7.8 (1.2)	7.2 (1.1)	<0.001
Patients at goal (<7%), n (%)	22 (18.3%)	78 (32.2%)	126 (61.8%)	<0.001
LDL Cholesterol (mg/dL), M (SD)	112.4 (28.3)	101.7 (26.1)	91.8 (24.6)	<0.001
Patients at goal (<100), n (%)	88 (73.3%)	199 (82.1%)	190 (93.1%)	<0.001
Systolic BP (mmHg), M (SD)	138.2 (11.4)	134.6 (10.8)	130.1 (9.7)	<0.001
Patients at goal (<130), n (%)	64 (53.3%)	165 (68.0%)	168 (82.4%)	<0.001
Diastolic BP (mmHg), M (SD)	81.2 (7.6)	79.4 (7.2)	77.8 (7.1)	<0.001
Patients at goal (<80), n (%)	72 (60.0%)	173 (71.3%)	162 (79.4%)	<0.001

4.5 Hierarchical Linear Modeling Results

Table 6: Multilevel Model Predicting Patient Self-Management Quality

Variable	Coefficient (β)	SE	p-value	95% CI
Level 1 (Patient-Level)				
Age (per 10 years)	-1.24	0.31	<0.001	[-1.85, -0.63]
Female gender	2.18	0.89	0.014	[0.44, 3.92]
Education (college+)	3.41	0.92	<0.001	[1.61, 5.21]

Diabetes duration >10 yrs	-2.87	0.84	0.001	[-4.52, -1.22]
Prior diabetes education	4.63	0.85	<0.001	[2.96, 6.30]
Level 2 (Nurse-Level)				
Nurse nutritional knowledge	0.512	0.086	<0.001	[0.343, 0.681]
Nurse CDCES certification	3.12	1.41	0.031	[0.36, 5.88]
Time on nutrition education/visit (min)	0.31	0.12	0.011	[0.07, 0.55]
Model Statistics				
Intraclass correlation (ICC)	0.18	—	—	—
Variance explained by nurse factors	28%	—	—	—
Overall model R^2	0.52	—	—	—

4.6 Subgroup Analyses

Table 7: Correlation between Nurse Knowledge and Patient SDSCA by Patient Subgroup

Patient Subgroup	N	Pearson r	p-value	95% CI
By Age				
<50 years	287	0.581	<0.001	[0.512-0.650]
50-65 years	562	0.528	<0.001	[0.461-0.595]
>65 years	398	0.412	<0.001	[0.336-0.488]
By Diabetes Duration				
<3 years	326	0.598	<0.001	[0.530-0.666]
3-10 years	624	0.521	<0.001	[0.459-0.583]
>10 years	297	0.379	<0.001	[0.298-0.460]
By Education Level				
<High school	198	0.467	<0.001	[0.357-0.577]
High school	593	0.512	<0.001	[0.440-0.584]
College+	456	0.548	<0.001	[0.475-0.621]
By Prior Education				
No prior education	400	0.629	<0.001	[0.563-0.695]
Prior education	847	0.451	<0.001	[0.387-0.515]

Mean nutritional knowledge of all nurses was 70.4% (SD=13.8%), which corresponds to basic-to-intermediate level of knowledge. A mere 27.3% of nurses scored proficient knowledge (≥80%), whereas around 20% of them demonstrated inadequate knowledge (<60%).

Nurses holding an MSN degree exhibited significantly higher nutritional knowledge (M=81.3%) than those with BSN (M=71.2%) and ADN (M=64.1%, $p<0.001$) education. Certified Diabetes Care and Education Specialists (CDCES) achieved a score much higher (M=82.1%) than that of non-certified nurses (M=65.3%, $p<0.001$).

Large differences in self-management quality were found between nurse knowledge categories. The self-management of patients of nurses with proficient knowledge (≥80%) was significantly better (M=42.3, SD=8.2) than that of patients of nurses with inadequate knowledge (M=28.4, SD=10.1), the difference between these two groups being 13.9 points (49% improvement, $p<0.001$).

Significant differences in all SDSCA domains were observed across nurse knowledge categories, with dietary adherence, glucose monitoring, and foot care showing the largest differences.

Nutritional knowledge of nurses showed statistically significant and clinically meaningful correlations with all patient outcomes. The strongest association was found with HbA1c (r=-0.521), which means that higher nurse knowledge was related to better glycemic control. In the same way, nurse knowledge was strongly related to general self-management quality (r=0.512).

Patients under the care of nurses with proficient nutritional knowledge achieved substantially better clinical outcomes. Mean HbA1c for patients of high-knowledge nurses was 7.2% as compared to 8.4% for patients

of low-knowledge nurses ($p<0.001$). The percentage of individuals meeting HbA1c targets raised from 18.3% to 61.8% going through the knowledge categories.

Lipid control and blood pressure management showed similar patterns, with patients of high-knowledge nurses being able to achieve therapeutic targets to a greater extent than those of low-knowledge nurses.

The hierarchical linear model showed that nurse nutritional knowledge was a major independent factor influencing patient self-management quality ($\beta=0.512$, $p<0.001$), thus explaining about 28% of the variance in patient outcomes at the between-nurse level. This effect retained its significance after adjusting for patient characteristics like age, education, and prior diabetes education.

Further, the time dedicated to nutrition education ($\beta=0.31$, $p=0.011$) and the nurse CDCES certification ($\beta=3.12$, $p=0.031$) were two other factors that independently influenced patient self-management, thus giving a hint that knowledge implementation in practice is the mediator of the knowledge-outcome relationship.

The association between nurse nutritional knowledge and patient self-management was particularly strong in younger patients (<50 years, $r=0.581$) and those who had diabetes for a shorter period (<3 years, $r=0.598$). Interestingly, the association was still significant in elderly patients >65 years ($r=0.412$, $p<0.001$), which means that the benefits of nurse knowledge are broadly applicable across different age groups.

It is also interesting to note that the strength of the knowledge-outcome correlation in patients who had not received diabetes education previously ($r=0.629$) was greater as compared to those who had diabetes education ($r=0.451$), thus indicating that the first education coming from knowledgeable nurses may have the most impact.

4.7 Nurse Perspectives on Knowledge Application

The qualitative comments from nurses unveiled a number of factors that hinder and facilitate nutrition knowledge application:

Barriers (mentioned by nurses):

- Lack of time during clinical encounters
- Limited access to nutrition specialists for obtaining advice
- Patient resistance to dietary changes
- Uncertainty about evidence-based recommendations

Facilitators:

- Access to standardized educational materials
- Multidisciplinary team rounds
- Continuing education opportunities
- Patient motivation and family support

5. Discussion

5.1 Key Findings

This research highlights a strong direct association between the nutritional knowledge of primary care nurses and the quality of self-management of patients with Type 2 Diabetes. Patients of nurses with proficient nutritional knowledge demonstrated:

Superior self-management quality (49% higher scores)

Better glycemic control (HbA1c 7.2% vs. 8.4%)

Greater achievement of therapeutic targets

Improved quality of life

The findings from this study are consistent with and extend the previous research on the impact of healthcare provider knowledge on patient outcomes.

5.2 Implications for Practice

1. Nurse Education Programs: Nursing curricula should guarantee comprehensive content on diabetes nutrition. The present findings indicate that a majority of graduates are not sufficiently prepared to take on this essential role.
2. Continuing Education: Healthcare organizations should enforce compulsory diabetes nutrition competency development together with periodic reassessment.
3. Interdisciplinary Collaboration: Collaboration between nurses and registered dietitian nutritionists can raise the quality of patient care.
4. Certification Support: Companies should encourage CDCES certification as certified nurses demonstrated superior knowledge and patient outcomes.
5. Resource Allocation: The time dedicated to nutrition education (mean 4.2 minutes in the current study) seems to be very short given the great impact it has on the results. Redesigned clinic workflows should ensure there is enough time for comprehensive nutrition education.

5.3 Strengths and Limitations

Strengths:
Large numbers of participants (187 nurses, 1,247 patients)
Several validated measurement instruments
Multilevel analysis accounting for clustering
Subgroup analyses checking for generalizability
Multiple outcome measures instead of a single endpoint

Limitations:
The cross-sectional design limits causal inference
Self-reported patient behaviors may introduce bias
Single healthcare system limits generalizability
Unmeasured confounders may influence results

Conclusions

This work highlights the importance of primary care nurses' nutritional knowledge as a major factor leading to improved self-management of patients with Type 2 Diabetes and better clinical outcomes. The effect size is clinically meaningful as about 28% of patient self-management variability can be attributed to nurse nutritional knowledge.

Healthcare institutions should focus on the development of nursing competencies through better education, support for certification, and continuous assessment of competency. These investments represent a high-impact lever for diabetes outcome improvement while at the same time lessening the risk of complications downstream.

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