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THE INFLUENCE OF NURSES' WORK ENVIRONMENT AND PATIENT-CENTERED CARE PRACTICES ON GLYCATED HEMOGLOBIN

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Abstract

In this cross-sectional study of 292 type 2 diabetics and their 49 family nurses in Portugal, we have examined the relationship between the nursing work environment and the implementation of patient- centred care practices, and between these practices and the glycated hemoglobin

(HbA1c). For this purpose, we used the Structural Equations Model (SEM) in order to test these relationships. The clinical supervision and resource adequacy as assessed by “The Practice Environment Scale of the Nursing Work Index (PES–NWI)” had a direct and positive effect on the quality of patient-centered care as measured by “Diabetes Education Process (DEP)”, which in turn had a negative and direct effect on the gold standard outcome of diabetes (HbA1c). For the sample under study, it has been shown that the care environment affects the development of clinical care practices centered on the patient and that these practices affect the results on patients with diabetes.

Keywords

Diabetes Mellitus; Work Environment; Patient-Centered Care; Outcomes

1. Introduction

In an era of economic restrictions, there are inevitably direct or indirect resources rationing, affecting also the nursing. Moreover all professions are required to demonstrate that the care they provide reaches the desired outcomes. Today’s challenge is to demonstrate that the care offered by nurses is effective. Publishing this evident and important data will help to prove the sustainability of this system, but also to increase recognition for the value of this discipline (Doran, 2010).

A clear understanding of the nature of the relationship between the nurses’ interventions and nursing outcomes is essential in order to help the nursing discipline to focus on improving health outcomes. It will also help to provide information for the definition of future health policies (Potempa, Daly, & Titler, 2012).

In this context of decreasing resources and increasing expectations of the population, chronic diseases represent one of the most relevant threats and challenges in health, emerging an impetus of the reorganization of health care and quality assurance, by measuring health outcomes (WHO, 2011).

Diabetes Mellitus represents a significant share among chronic diseases (IDF, 2012), placing Portugal among the countries with the highest rates of prevalence in Europe (Gardete et al., 2013).

Although currently we cannot identify a unique therapeutic strategy to be the best suitable for diabetes education (Menino, Dixe, Louro, & Roque, 2013), it is consensual the value of diabetes education and the importance of the patient-centred care approach.

It is generally considered that the nurse is the key element to implement care within the chronic disease model through a patient-centred care approach (Bodenheimer, MacGregor, & Stothart, 2005).

There are many studies in other disciplines about effectiveness of patient-centered care, but there is little evidence demonstrating the relationship between person-centered practice in nursing and the positive outcomes for patients (McCormack & McCance, 2006).

The person-centred nursing framework “makes explicit the need for nurses to move beyond a focus on technical competence, and requires nurses to engage in authentic humanistic caring practices that embrace all forms of knowing and acting to promote choice, decision-making and partnership in care (McCormack & McCance, 2006).

This framework is based on four constructs: (1) prerequisites, which describes the attributes of the nurse; (2) the care environment, which focuses on the context in which care is delivered; (3) person- centered processes, which focus on delivering care through a range of activities and (4) expected outcomes, which are the results of an effective person-centered nursing process. To reach these outcomes, prerequisites must first be considered, as well as the care environment which is necessary for an effective care, together with the care processes as well.

In this research we used this framework to establish the relations between these four elements.

We considered also the nursing practice environment as corresponding to the organizational characteristics of a working environment that constrains or facilitates nursing practice (Lake, 2002). Despite this conceptual vision, we assumed also the care environment would focus on the context in which care is delivered through appropriate skill mix, on systems that facilitate shared decision-making; on effective staff relationships, supportive organizational systems, sharing of power, and the potential for innovation and risk-taking (McCormack & McCance, 2006).

A growing number of studies analyze the relationships between improvements in organizational factors, the practice environment and measurable changes in results of users (Lundstrom et al., 2002).

In nursing, several studies have revealed strong links between organizational conditions and nursing resources, and adverse reactions of users (Friese et al., 2008).

The professional practice environment of nurses and adequacy of resources are structural factors that are directly correlated to the results and the quality of care (Lambrou et al., 2014). In

outcomes area, Milne (2013) believes that clinical supervision is also increasingly recognized as a vital part of modern and effective health systems.

On the other hand, patient-centered care is an approach widely recognized and there is growing evidence in the literature to be cost-effective and leading to health gains (Emerson, 2006; Titchener, 2014), being also a desirable and effective approach in care to the patient with diabetes (Williams & Zeldman, 2002).. The patient-centered care in nursing supposes “shared decision making, i.e. nurses facilitating patient participation by giving information and integrating newly formed perspectives into established practices. This must involve a process of negotiation that takes into account individual values to form a legitimate basis for decision-making, the success of which relies on good processes of communication (McCormack & McCance, 2006).

Outcomes are the results expected from effective person-centred nursing (McCormack & McCance, 2006).

In the area of diabetes, HbA1c is currently considered as the primary outcome, and widely regarded as the "gold standard", therefore the major outcome for users with type 2 diabetes (Bryśkiewicz & Majkowska, 2011).

Considering the above, it is important to know the nature of the relationship between the nurse practice environment and the patient-centered care approach and the relation of this approach in diabetes outcomes. In addition it is important to understand if the care provided by nurses to diabetics is effective, in other words, if care provided considering patient-centered care principles is related with diabetes outcomes.

2. Method

This was a cross-sectional study. We inquired 292 patients with type 2 diabetes and their family nurses (N=49) who were responsible for diabetes care in primary health care in Portugal. After having shared the purpose of the study and obtained their consent, a structured questionnaire was administered by interview to diabetics, by four trained assistants and the head of the study, which included socio- demographic questions and the value of HbA1c on the latest blood tests written in “Diabetic Book”.

We delivered nurses a self-administered questionnaire which included questions about socio- demographic and professional data. It included questions about their practice environment assessed using the Practice Environment Scale of the Nursing Work Index (PES-NWI) (Amaral,

Ferreira, & Lake, 2012) and about interventions and practices in the scope of patient-centered care, assessed by a tool developed for this purpose (DEP).

The study received the approval declaration number 3254 by the Ethics Committee and the Administration Departments of those health facilities. Data were collected from November 2013 to April 2014.

Portugal is divided in geographic regions with various groups of health centers. We recruited 292 diabetics and 49 nurses from one of these areas (Central Portugal), which includes rural and metropolitan areas. The inclusion criteria for these diabetics were: 18 years-old and older; speak and understand Portuguese; have cognitive ability to answer the questionnaire (assessed by nurses accompanying patients). For nurses the inclusion criteria were to be responsible for providing nursing care for those patients, and that they agreed to autofill the questionnaire.

Data were collected during the period of diabetes appointments in health centers, which occurred usually once per week in each health center. We included 22 health facilities in the central Portugal region. This was a convenience sample both patients and nurses.

When conducting such studies Hair, Hult, Ringle and Sarstedt (2013) state that we need a sample which is 10 times the largest number of structural paths directed at a particular construct in the structural model for partial least squares (PLS) analysis. Our final model included three dependent variables with a maximum of two structural paths directed to a construct (dependent variable), so we needed at least 20 patient-nurse groups for an adequate sampling size.

Descriptive statistics are reported as mean and standard deviation (SD). The relation among environment variables, nurse practice variables and diabetics outcomes were examined using PLS analysis. We chose PLS over traditional approaches such as bivariate correlations because it analyses multiple relations simultaneously which is an approach more similar to reality in social sciences (Hair, Hult, Ringle, & Sarstedt, 2013) Considering the above, we performed an evaluation of the results using the Structural Equation Model (SEM) after having first performed validation studies of instruments on the samples (both nurses and patients).

The SEM may be estimated by two methods: (1) CB-SEM based on the covariance, or (2) PLS-SEM method (also called PLS modelling path) based on the variance of the endogenous variables (Vilares & Coelho, 2005). This is essentially used to develop exploratory research theories (Hair et al., 2014), as is the case here.

The PLS-SEM works effectively with small samples and complex models, and should be selected when the assumptions regarding the CB-SEM are violated, especially when the normal

distribution is not guaranteed, when the sample does not have the required size, when the complexity of the model is high, or when using different types of scales (Vilares & Coelho, 2005; Hair et al., 2014).

This is the reason why we have chosen to use PLS-SEM methodology for the present study.

The PLS methodology involves a number of applications from ordinary least squares and calculating the correlation coefficients, and the measures and techniques are nonparametric (Vilares & Coelho, 2005).

For the global evaluation of the model, the PLS-SEM is based on heuristic criteria based on model predictability capacity. These criteria assume that the model is evaluated in terms of how well it provides the endogenous variables (which are the variables explained by the model) (Hair et al., 2014).

Once we had guaranteed the validity and reliability of measuring instruments, the next step was to evaluate the results of the structural model, which involved analyzing the predictive capabilities of the model and the relationship between the constructs (latent variables) (Hair et al., 2014).

We first analyzed the composite reliability and discriminant validity of the instruments. The items with factor loadings greater than 0.30 in factor analysis remained once it showed a good correlation between the item and the latent construct (Almeida & Freire, 2007). We had accepted the reliability values when we obtain composite reliability values greater than 0.7 (Streiner, Norman, 2008).

Next, we tested the hypothesized model by estimating path coefficients and their corresponding t- values by the PLS bootstrapping method.

The Path Coefficient is considered statistically significant, meaning it allows us to evaluate if a variable contributes significantly to a particular construct / latent variable, by analysing the t value. T values generally used are 1.65 (significance level = 10%), 1.96 (significance level = 5%) and 2.57 (significance level = 1%). The significance level used in this study was 5%.

The predictive power of the model was examined by the r^2 value. Only the statistically significant covariates were included and adjusted for in the final model.

Statistical analyses were performed using Smart PLS® and SPSS 21.0 software.

3. Results

The characteristics of diabetics are in table 1. The mean age was 68 years (S.D=9.8).

Table 1: Socio Demographics of Diabetics (n=292)

		N°	%
Gender	Female	143	49,5
	Male	146	50,5
Marital Status	Single	11	3,8
	Married	220	75,3
	Divorced	9	3,1
	Widower	52	17,8
Education	0 years	37	12,8
	1-4 years	205	71,2
	5-9 years	29	10,1
	10-12 years	7	2,4
	Bachelor	4	1,4
	Graduation	6	2,1

Most patients had been diagnosed with diabetes for 5 years or less (38.4%). With an average of 9.8 years of diagnosis (SD = 8.3), with the minimum value lower than a month and a maximum value of 40 years of diagnosis.

The nurses sample had an average age of 43 years (SD = 7.5), with a maximum age of 62 years and a minimum of 29 years.

As for nursing education, most nurses hold a 4 years graduation degree or legal equivalent (69.4%), the second largest group holds a specialty degree (16.3%) and a percentage of 12.2% had a bachelor's degree or legal equivalent. There was reference to a master degree by 2% of nurses.

Nurses were in the profession for an average of 19.2 years (SD = 7.8; range: 3-40 years). Regarding the area of diabetes and the frequency of training in this area, after early professional career, most respondents (61.2%) reported having attended such training, while 38.8% reported not having attended any training in this area since they started working as a nurse. 62.2% consider the training in diabetes area insufficient and 37.8% enough.

To proceed with the characterization of the nursing practice environment we used to PES-NWI. The average point for each item is 2.5 (range: 1-4); so the factor that had the best value was the inter and intradisciplinary organization with an average value of 2.98 (SD = 0.44). On the other hand, the factor with the lowest value was adequacy of resources with an average of 2.04 (SD = 0.63).

The scale “Diabetes Education Process (DEP)” assesses the frequency with which nurses develop a set of interventions considered good practice within the therapeutic education. The patient-centered care is a dimension of this scale, it had scored 3, 71 (S.D=0, 82) as shown in table 2.

Table 2: Mean, Standard Deviation among Latent Constructs for Nurses Sample (N=49)

Factors and Related Items	Range	Mean (SD)
Inter and Intraorganization	1-4	2,98 (0,44)
Supervision of Care	1-4	2,54 (0,42)
Resource Adequacy	1-4	2,04 (0,63)
Patient-Centered Care	1-5	3,71 (0,82)

The composite reliability scores were all over 0, 70 supporting the reliability of the measures of the 3 latent variable.

The PLS analysis results for the hypothesized model are presented in figure 1.

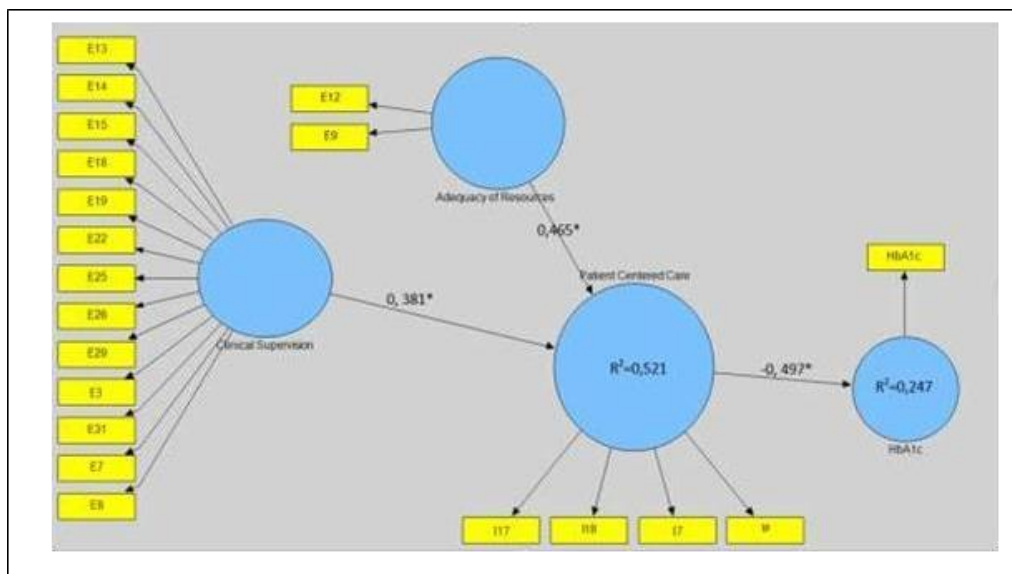


Figure 1: The partial least squares model for Adequacy of resources, clinical supervision, patient- centered care and HbA1c. The circles represent the latent variables and the rectangles represent observed variables. Standardized path coefficients are presented between the latent variables. * $p < 0.01$

Adequacy of resources had a direct and positive effect on development of patient-centered care interventions (path coefficient=0,465, $t=3, 24$, $p < 0.01$). Clinical supervision had also a direct and positive effect (path coefficient=0,381, $t=2, 63$, $p < 0.01$). The adequacy of resources and clinical supervision accounted for 52.1% of the variance in patient-centered care.

Patient-centred care had a negative and direct effect on HbA1c (path coefficient=0,497, $t=2, 73$, $p < 0.01$). Patient-centered care accounted for 24.7% of the variance in HbA1c.

Considering figure 1, we found that the adequacy of resources and clinical supervision exerted their effects on HbA1c through the frequency of development of patient-centered care in this sample of patients with type 2 diabetes and their nurses in primary health care. The adequacy of resources and clinical supervision affected the development of interventions in the scope of patient-centered care by nurses and these interventions affected directly and negatively HbA1c. The results support previous findings that recognize the influence of factors inherent to the structure/environment of care in the quality of care process and the results obtained on patients (Gardner, Gardner, & O'Connell, 2014; You et al., 2013; Kirwan, Matthews, & Scott, 2013).

The results suggest that adequacy of resources and clinical supervision did not have direct effect on HbA1c, and its effect is mediated by patient-centred care. The importance of this patient-centered approach is widely assumed and associated with patient outcomes (Glasgow, 2001). The relation between patient-centered care and metabolic control is also corroborated in literature (Titchener, 2014).

These results underline the importance of having good clinical supervision in nursing practice and that the adequacy of resources plays an important role in the implementation of an adequate care. In this sample, care based on patient-centered approach was associated with better patient results (HbA1c). This finding suggests that the structural variables such as clinical supervision and adequacy of resources will not lead to positive outcomes without appropriate care. The adequate structure influences the adequate intervention which in his turn affects main outcomes.

4. Conclusion

We found that the effect of structural variables such as adequacy of resources and clinical supervision influences nurse's interventions in area of patient-centered care. This approach showed to be related with better patient outcomes (HbA1c).

We let the key message for researchers and decision makers that we need to consider the evaluation of diabetes education practices and the environment in which they are developed and the evidence of its effectiveness (considering main outcomes in diabetes).

It's important that we still allocate adequate resources and provide adequate supervision, but the resultant model revealed that those variables are only related with better outcomes if an adequate intervention exists mediating its effect.

Besides our findings, we assume as limitation that this was a cross-sectional study, so causal relationships could not be tested.

We propose for future research longitudinal studies using the same instruments and framework, in order to validate the proposed structural relations.

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