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Literacy in health and self-care in people with type 2 diabetes mellitus

Alfabetização em saúde e autocuidado em pessoas com diabetes mellitus tipo 2

Alfabetización en salud y autocuidado en individuos con diabetes mellitus tipo 2

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ABSTRACT

Objective: To evaluate the effect of educational intervention in the adherence to self-care activities and functional health literacy and numeracy in people with type 2 diabetes mellitus. **Methods:** This was a quasi-experimental study conducted in two units of the Brazilian Family Health Strategy, involving people with diabetes. Educational interventions occurred in three meetings, weekly, lasting 60 minutes on average. Data were collected using the Questionário de Autocuidado com o Diabetes, before and after the interventions. **Results:** 55 people participated in the study. After the interventions, the greatest difference for a better adherence to self-care was the item "inspecting the inside of the shoes before putting them on", with 3.29 days in the week delta at analytical level. The worst was "taking insulin shots as recommended", with 0.00 days a week delta at basic level. **Conclusion:** Educational interventions had a positive effect on adherence to self-care and functional literacy in health.

Descriptors: Type 2 Diabetes Mellitus; Health Education; Health Literacy; Self-care; Nursing.

RESUMO

Objetivo: Avaliar o efeito de intervenção educativa na adesão às atividades de autocuidado e letramento funcional em saúde no domínio numeramento em pessoas com diabetes *mellitus* tipo 2. **Método:** Estudo quase-experimental, conduzido em duas unidades da estratégia de saúde da família, envolvendo pessoas com diabetes. As intervenções educativas aconteceram em três encontros, semanalmente, com duração média de 60 minutos. Os dados foram coletados pelo Questionário de Atividades de Autocuidado com o Diabetes, antes e após as intervenções. **Resultados:** Participaram do estudo 55 pessoas. Após as intervenções, o item que obteve maior diferença para uma melhor adesão ao autocuidado foi "examinar dentro do calçado antes de calçá-los", com delta de 3,29 dias na semana, nível analítico. O pior foi "tomar as injeções de insulina conforme recomendado", com delta de 0,00 dias na semana, nível básico. **Conclusão:** As intervenções educativas apresentaram efeito positivo na adesão ao autocuidado e letramento funcional em saúde.

Descritores: Diabetes Mellitus Tipo 2; Educação em Saúde; Alfabetização em Saúde; Autocuidado; Enfermagem.

RESUMEN

Objetivo: Evaluar el resultado de una intervención educativa en la adhesión a las actividades de autocuidado y de literacidad funcional en salud en el dominio de numeración en individuos con diabetes mellitus tipo 2. **Método:** Estudio casi experimental realizado en dos unidades de estrategia de salud de la familia, del cual participaron individuos con diabetes. Las intervenciones educativas se realizaron durante tres encuentros semanales, con una duración media de 60 minutos cada una. Los datos fueron recolectados mediante el Cuestionario de Actividades de Autocuidado con la Diabetes, antes y después de las intervenciones. **Resultados:** Participaron del estudio 55 individuos. Después de las intervenciones, el ítem con mayor diferencia en la mejor adhesión al autocuidado fue "examinar el calzado antes de ponerlo", con el delta de 3,29 días a la semana, nivel analítico. El peor fue "aplicar las inyecciones de insulina según lo recomendado", con el delta de 0,00 días a la semana, nivel básico. **Conclusión:** Las intervenciones educativas tuvieron un efecto positivo en la adhesión al autocuidado y la literacidad en salud.

Descriptores: Diabetes Mellitus Tipo 2; Educación en Salud; Alfabetización en Salud; Autocuidado; Enfermería.

INTRODUCTION

Type 2 diabetes mellitus (DM) is a chronic disease and a global health problem, affecting about 422 million people worldwide[1]. The epidemic of type 2 DM has grown at an alarming rate, resulting in severe socioeconomic and health impacts, especially in developing countries[2], where about 80% of affected people live. These are places where the epidemic is aggravated due to the coexistence of infectious diseases. The prevalence of type 2 DM in Brazil is 8.9%, which may vary between states[3].

Although the life quality of a type 2 DM patient is affected, the patient can live a normal life and perform the self-care activities required for his/her health situation to control symptoms and avoid complications in the long term. Therefore, learning how to change eating habits, exercising regularly, following the prescribed pharmacological therapy, performing blood-glucose self-monitoring and being able to perform essential foot care are among the self-care activities required for the patient[2].

Given that patients have to cope with the disease and participate in self-care activities, they must be health literate, since individuals with limited training and insufficient health literacy tend to have more difficulties during therapy[4,5], presenting low adherence to the therapeutic regimen, poor understanding of health problems, lack of self-care knowledge, low use of preventive services, poor general health and morbidity[6,7].

These skills comprise what is understood as functional health literacy (FHL), which consists of cognitive and social skills; these determine an individuals' motivation and ability to access, process and understand information and basic health services necessary to make appropriate health decisions[8]. FHL is also related to the ability to understand self-care and health care system aspects to make such decisions.

Several studies have discussed the relationship between inadequate FHL and worse blood-glucose control, more hypoglycemic events and higher retinopathy rates[9-11]. Other studies found associations between low FHL and higher health expenditure, as well as increased use of emergency services, increased hospitalization costs, disability and deaths[12-14].

In FHL domains, numeracy is defined as the degree of ability individuals have to access, process, interpret, communicate and act upon information about health: numerical, quantitative, graphical, biostatistical, and probabilistic. Each of these five mathematical skills are categorized into four levels that vary according to their functionality: basic, computational, analytical, and statistical[15].

Therefore, health education is recommended as a strategy for the development of skills and abilities to care for one's own health and for improving FHL to support learning in an attempt to expand self-care activities[16].

This study used FHL as an evaluation instrument to detect the effect of a health education practice involving people with type 2 DM.

OBJECTIVE

To evaluate the effect of an educational intervention on the adherence to self-care activities and functional health literacy in the numeracy domain in people with type 2 DM.

METHODOLOGY

Ethical aspects

This study was approved by the Research Ethics Committee in Human Beings of Universidade Estadual do Ceará, via Plataforma Brasil. This study followed all guidelines for research in human beings foreseen in Resolution no. 466/2012 of the Brazilian National Health Council[17].

Design, place and period

This is a quasi-experimental study developed in a master's thesis of the Graduate Program in Clinical Care in Nursing and Health of Universidade Estadual do Ceará, with a before and after design, conducted from March to July 2016, in two units of the Brazilian Family Health Strategy (ESF) in the city of Picos, Piauí.

Population and sample: inclusion and exclusion criteria

The study sample comprised 55 patients with type 2 DM. They were considered from the following inclusion criteria: having a medical diagnosis of type 2 diabetes mellitus for at least six months (since it is believed that during this period the patient has already been guided by professionals about the importance of self-care), aged between 30 and 69 years, of both sexes, registered and regularly followed-up on in the chosen ESF. Exclusion criteria were: presenting any apparent difficulties that made communication and responding to the instrument unfeasible and the impossibility of measuring their anthropometric measures.

Study protocol

Data were collected through an interview composed of two instruments. The first was a previously tested semi-structured form containing socioeconomic data (sex, age, family income, schooling and marital status), prepared by the main researcher. Another instrument was used for the evaluation of self-care activities, the *Questionário de Atividades para Autocuidado com o Diabetes* (QAD), which has been extensively used for studying the average number of days in the week that the diabetes patient dispenses with self-care activities; the version used in this study was a translated, adapted and validated version to the Brazilian culture[18] of the Summary of Diabetes Self-Care Activities Measure (SDSCA)[19].

The QAD is a seven-point Likert scale with six dimensions and 15 items for assessing diabetes self-care: general diet (with two items), specific diet (three items), exercise (two items), blood-glucose testing (two items), foot care (three items), medication use (three items, used according to the drug regimen) and smoking assessment (three items). Adequate behavior and desirable self-care were considered when the mean was ≥ 5. For the items "eating red meats and/or full-fat dairy products" and "eating sweets" corresponding to the dimension "specific diet", the analysis occurred in a reverse manner, as they correspond to the undesirable activities. Therefore, they were considered as desirable if the mean was ≤ 4. These evaluations were considered pre-intervention data, being performed approximately 15 days before the beginning of the intervention.

The nursing education intervention comprised three meetings that sought to train type 2 DM patients for the adoption of appropriate behaviors considering their condition. These meetings between the main researcher and the patients occurred in two ESF and were consecutive, with a weekly interval. All meetings followed the same order and pattern, allowing all diabetes patients to have the same experience. Each meeting lasted approximately 60 minutes and was conducted by one of the ESF's nurses and the researcher.

The first meeting sought to stimulate patients' knowledge regarding the disease, its signs and symptoms, the importance of blood-glucose control, presenting which are normal and altered values, and the prevention of acute and chronic complications. For such, a roundtable conversation was conducted using educational posters containing illustrations that allowed the visualization, identification and reflection on the action of the disease on the body and the importance of blood-glucose control as a way to prevent complications. Discussions were followed by awareness about the need to care for these values for the maintenance of health, otherwise leading to some problems in case of prolonged neglect.

In the second meeting, the roundtable discussion was conducted using educational posters that focused on important aspects of diabetes self-care practices as an effective measure for adopting good habits. The following aspects regarding self-care practices were emphasized: adherence to non-drug therapy (healthy eating, physical exercise, smoking and alcohol use), adherence to drug treatment (oral anti-diabetics and insulin) and blood-glucose monitoring. After the conversation, patients were allowed to freely practice self-care measures.

The third and final meeting focused on encouraging foot care, based on a practical experience. For such, the conversation started by using educational posters with images highlighting appropriate and inadequate aspects regarding foot care so patients with diabetes could differentiate appropriate and harmful practices to the feet. Following, the nurse and researcher offered the participants the opportunity to apply appropriate foot care practices, explaining each procedure to them. To reduce the doubts, the researcher demonstrated the activities on herself, washing, drying and hydrating her own feet. In the end, she invited and donated material (water container, towel and moisturizer) for each one interested in participating in the activity. All patients accepted and were interested in it. This action sought to teach the correct way of washing, drying and hydrating the feet, as well as to guide the participants to look for changes in their feet and on the use of appropriate shoes and socks and teaching the appropriate cutting of toenails.

In general, diabetes patients showed great participation, particularly in the activities that covered their greatest interest, such as non-drug and drug therapies and complications of the disease, especially regarding the feet and the experience of washing, drying and hydrating them.

The evaluation of self-care activities and functional health literacy were verified in all study participants one month after the end of the educational sessions. Thus, the efficacy of the educational intervention was assessed by the deltas of QAD scores, which were obtained by subtracting the mean of days of the week post- and pre-intervention, thus generating positive and negative values.

QAD data were categorized according to functional health literacy levels and verified in which FHL levels were the best and worst self-care activities. The basic level presented sufficient knowledge to identify the numbers and attribute meaning to quantitative data (medication use, exercise). The computational level involves the ability to count, quantify, calculate and manipulate numbers, quantities, items or visual elements in a health context, to apply them in everyday situations (adequate food portions).

The analytical level involves a higher literacy level than previous ones. This level involves the capacity to attribute meaning to information and the high level of concepts such as inference, estimation, proportions, percentages, frequencies and equivalent situations (blood-glucose monitoring and self-examination of the feet). The statistical level involves understanding basic biostatistics, including skills to compare information provided at different scales (probability, proportion, percentage) and the ability to critically analyze quantitative health information, such as life expectancy and risk (cigarette use).

Analysis of results and statistics

Data were processed in *the Statistical Package for the Social Sciences* (SPSS) software, version 20.0, under license no. 10101113007. Data were analyzed using descriptive statistics. Wilcoxon's test and McNemar's test were used for the analysis of significance and comparison of the changes that occurred before and after the educational interventions.

RESULTS

This study involved 55 people, of which 35 (63.6%) were female, with 59.29 (± 9.1) years mean age; 46 married (83.6%); 22 white (40.0%); 33 with schooling ≤ 4 years (60%); and 1,724.2 (± 761.8) BRL in average income. Results found that 27 participants lived with 3 to 5 people (49.1%), 51 reported being Catholic (92.7%) and 20 were retired (36.4%).

Table 1 presents data referring to the delta of the QAD items according to the means of days of the week and FHL in the numeracy domain in health, post- and pre-educational intervention.

Deltas were obtained by subtracting the mean of days for each self-care activity, post- and pre-educational intervention, thus generating positive and negative values. The dimension that obtained the greatest difference for better adherence to self-care activities was the "foot care" dimension in the item "inspecting the inside of the shoes before putting them on", with 3.29 days in the week difference between means, while the worst dimension was "drug use" in the item "taking the insulin shots as recommended", with 0.00 days in the week difference between means. According to health numeracy levels, the best and worst adherence items were at the analytical and basic levels, respectively.

The items with negative delta results also represented a good adherence to self-care practices, since, for the items "eating red meat and/or full-fat dairy byproducts" and "eating sweets", the analysis was made in reverse, since these items represent undesirable activities, which means that patients reduced the intake of red meat and/or full-fat dairy products by -1.91 days in the week and of sweets in -0.87 days in the week at computational level.

Table 1 – Deltas of the items of the Questionário de Atividades para Autocuidado com o Diabetes according to the means of days of the week and Functional Health Literacy in the levels of the numeracy domain in health, post- and pre-educational intervention, of the single group. Picos, Piauí, Brazil, 2016

Questionário de Atividades para Autocuidado com o Diabetes	Delta post-intervention and pre-intervention	Numeracy levels in health
1.1 Following a healthy diet	1.07	Computational
1.2 Follow the diet guidance	0.43	Computational
2.1 Eating five or more servings of fruits and/or vegetables	0.71	Computational
2.2 Eating red meat and/or full fat dairy byproducts	-1.91	Computational
2.3 Eating sweets	-0.87	Computational
3.1 Performing exercises for at least 30 minutes daily	0.66	Basic
3.2 Performing specific physical exercise	0.71	Computational
4.1 Measuring blood-glucose	2.00	Analytical
4.2 Measuring blood-glucose as recommended	0.9	Analytical
5.1 Examine the feet	2.02	Analytical
5.2 Inspecting the inside of the shoes before putting them on	3.29	Analytical
5.3 Drying the spaces between the toes after washing them	2.22	Analytical
6.1 Taking diabetes drugs as recommended	0.24	Basic
6.2 Taking insulin shots as recommended	0.00	Basic
6.3 Taking the recommended number of pills for diabetes	0.15	Basic

Regarding smoking habits, 7 patients (12.7%) reported using tobacco, smoking about 6 cigarettes per day. Thus, the number of smokers after the interventions was the same and no change was found (p=1.000); this item was located in the statistical domain.

DISCUSSION

Sociodemographic data are considered one of the dimensions for understanding FHL[20]. Women were more prevalent in this study, a similar profile to the Brazilian projection of the population of women, which in 2030 will correspond to 50.6% of the total population[21]. We also note that women tend to use health services more often than men[22].

The predominant age group was ≥ 60 years and mean age was 59.29±9.1 years. As people age, cognitive function, memory and motor skills present a decline, as well as reduced visual acuity; thus, these factors impair the ability of individuals to access, interpret, and act on health information[24], making it difficult to understand and apply FHL levels in practice. Furthermore, older adults generally use health services more often and are more predisposed to more complex and more frequent intervention procedures[24-25].

However, not only age, but low schooling levels also directly influence the patients' performance on FHL[5]. In this study, a large part of the sample present low schooling level, considering that 33 (60.0%) participants had up to four years of schooling. This may have influenced the low performance of FHL achieved by participants in the daily self-care activities, since people who do not complete formal education up to fifth grade of elementary school are considered functionally illiterate[26]. This data corroborates with other studies that discussed the same group and theme[27-28].

Marital status is reported in several studies as a condition that favors FHL. In this study, 46 participants (83.6%) were married and 27 (49.1%) lived with 3 to 5 people. A study that analyzed the relationship between FHL, self-care and blood-glucose control showed that an indirect effect may arise in self-care activities on blood-glucose monitoring through social support, i.e., the patient's low understanding ability about the treatment and control of the disease can be compensated the involvement of important people in his/her life, such as family and friends[29].

Regarding family income, the mean found was 1,724.2±761.8 BRL, and it was found that 20 (36.4%) were retired. Such data favor the difficulty in accessing both health care services and general medical information, further demonstrating the need for health education with a focus on preventive actions, which are more practical and effective in this scenario.

Regarding the health condition of the study participants, all had type 2 DM. This disease is one of the most important non-communicable chronic diseases, affecting millions of people worldwide. Thus, patients with type 2 DM are at an increased risk of developing micro- and macrovascular complications and comorbidities, which can only be reduced if patients actively participate in the disease's management[30].

The patient must develop several skills for the success of self-management of the disease, including a certain level of health literacy, as well as knowledge about the disease, decision making and therapy planning[30]. Regarding the ability to perform such management, we emphasize that low FHL can hinder the comprehension level and be one of the complicating factors capable of interfering in blood-glucose control and maximize the repercussions of disease progression[28].

In general, people with chronic diseases have a low FHL level due to the difficulty to control the chronic condition, in addition to low participation in health promotion programs and difficulty in accessing information and health care services[31].

According to the deltas obtained from the means of days of the week of the QAD, the item that obtained the greater positive difference was "inspecting the inside of the shoes before putting them on", with 3.29 days in the week difference between means and situated at the analytical level of FHL. Among the complications of diabetes, diabetic foot is one of the leading causes of disability and

premature death. Therefore, to prevent diabetic foot, strict blood-glucose control and appropriate foot care are required, such as daily and systematic inspection of the feet and of the inside of the shoes.

For developing countries, factors related to poverty, literacy and environmental barriers delay the seeking for therapy and lower priority given to foot care by patients and health professionals have been cited as the main contributory factors that may lead to increases in the risk of complications in the feet[22].

In this FHL dimension, the analytical level requires a higher level of health literacy and is classified as the patient's ability to attribute new meanings to information and put it into practice, thus applying it in their therapy. From the results of this study, we can observe that the educational intervention conducted favored the growth of adherence to the practice of shoe inspection, which was not commonly performed and which, even at the analytical level and represented by the greater complexity of the relation – receiving information from the educational intervention, inference and application to reality –, the results were a great success in this study.

On the other hand, the item with the lowest difference and consequently, the worst adherence, was "taking the insulin shots as recommended", with 0.00 days in the week difference between means and classified at the basic level of FHL.

Using insulin is fundamental in type 2 DM therapy for patients unable to achieve blood-glucose control regardless of the established therapy (diet, biguanides and sulfonylureas). The main goal for insulin therapy for type 2 DM is to maintain blood glucose within the limits of normality over the day, avoiding the wide blood glucose variability and reducing the probability of chronic microvascular and cardiovascular complications such as acute myocardial infarction and coronary artery disease [32].

One of the fundamental components for patient training in dealing with insulin use is the ability to deal with numbers. A research conducted in the United Kingdom reported that information provided to diabetes patients presents poor readability scores, requiring literacy skills well above adult averages, since the UK presents high numbers of adults with low numeracy levels when compared to other countries [33]. There is no data on such fact for Brazil.

A study conducted with the African American population showed that patients with lower FHL levels were almost six times more likely to have glycated hemoglobin ≥ 8% compared to those with adequate FHL[34].

Data from this study shows the need for interventions aimed at self-management of diabetes in clinical practice, in which educational interventions must address content that meets the health literacy needs of the patient population. These data reinforce findings from other studies and reinforce the scarcity of studies on the subject, as well as the need for further research on FHL and numeracy-focused educational interventions for people with diabetes[34-35].

Study limitations

As limitations of this study, we highlight the use of convenience sampling with patients from only two units of the Brazilian Family Health Strategy, which impairs the generalization of our findings to all other units. Other limitations of this research were the difficulty of adherence of patients to participating in the study, the time of the educational interventions, since the researcher had to adapt several times to be able to contemplate all participants and avoid absences. The lack of a control group and the fact that the revaluation was performed only once after the end of educational interventions, which probably prevented the monitoring of the effects of educational interventions in the long term can also be considered as limitations. We suggest that future studies include time-series evaluations for the longitudinal follow-up of participants. Furthermore, the chosen ESFs for this study did not conduct this type of activity with their patients; if such activities occurred routinely they could maximize the educational interventions performed by the researcher.

Contributions to the field of nursing

Performing this type of study refers to the expansion of knowledge for Nursing to be strengthened as a science, regarding the expansion of evidence, with emphasis on the use of educational interventions aimed at improving daily self-care activities and functional literacy in type 2 DM patients, thus making him/her the subject of his/her own treatment. In addition, it broadens the knowledge on the subject, since the available literature is scarce, especially in Brazil, where research on health literacy is still incipient. This study highlights the need for more publications involving functional health literacy and diabetes patients, as well as serving as encouragement for studies like this being performed. This study advances in knowledge by showing that educational actions offered by professionals improve blood-glucose control, reduce complications and favor the support to the health care of patients.

CONCLUSION

The results of this study showed the relevance of providing educational interventions for type 2 DM patients who receive care at ESF, focusing on self-care and functional health literacy at numeracy levels, considering that the accomplishment of these educational interventions in Nursing favored the increase on the mean of the deltas of days of the week that the patient uses for self-care activities.

Inadequate functional health literacy is not only an individual problem, but a social impairment that can be improved through educational actions focused on improving self-care abilities required for type 2 DM, such as access to information, encouraging the search for information and for health care services, the effective communication with the health team and practicing activities required to control the disease.

Given the scarcity of studies designed around the same associations made in this research in the literature, it is essential for health teams to be awakened to educational interventions that aim not only to address the disease but also that try to encompass actions to be continuously performed, seeking to care for patients in their health literacy needs; thus, effectively influencing more favorable outcomes in type 2 DM via adequate health literacy – especially health numeracy –, since the diabetes patients need this knowledge throughout their entire life. Finally, we concluded that educational interventions had a positive effect on adherence to self-care and functional health literacy.

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