Educational intervention to promote self-care in older adults with diabetes mellitus*

Intervenção educativa para a promoção do autocuidado de idosos com diabetes mellitus

Intervención educativa para la promoción del autocuidado de ancianos con diabetes mellitus

🆔 **Marilia Braga Marques**[1]

🆔 **Janaína Fonseca Victor Coutinho**[1]

🆔 **Mariana Cavalcante Martins**[1]

🆔 **Marcos Venícios de Oliveira Lopes**[1]

🆔 **Juliana Cunha Maia**[1]

🆔 **Maria Josefina da Silva**[1]

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[1] Universidade Federal do Ceará, Faculdade de Farmácia, Odontologia e Enfermagem, Programa de Pós-Graduação em Enfermagem, Fortaleza, Ceará, Brazil.

ABSTRACT

Objective: To evaluate the efficacy of an educational nursing intervention in self-care for older adults who have Diabetes Mellitus. **Method:** A quasi-experimental study with control and intervention two groups conducted with older adults living with Diabetes Mellitus, attended at Primary Health Care Units of Fortaleza/Ceará. The intervention was a group educational approach with guidelines on diabetes treatment and foot care. The Brazilian adapted version of the Summary of Diabetes Self-Care Activities Questionnaire (SDSCA) was used for evaluating before-and-after self-care. A significance level of 0.05 was considered. **Results:** 103 older adults participated in the study. There was an increase in self-care for diabetes after the educational intervention related to the aspects: healthy diet (p = 0.027), dietary instruction (p = 0.013) and foot examination (p = 0.012). **Conclusion:** The performed intervention promoted positive behavioral changes, favoring the adoption of healthy habits and the promotion of self-care in older adult patients with Diabetes Mellitus.

DESCRIPTORS

Diabetes Mellitus; Aged; Self Care; Diabetic Foot; Nursing Care; Health Education.

Corresponding author:
Marília Braga Marques
Universidade Federal do Ceará,
Departamento de Enfermagem
Rua Alexandre Baraúna, 1115, Rodolfo Teófilo
CEP: 60430-160 – Fortaleza, CE, Brazil
mariliabm1@hotmail.com

INTRODUCTION

Diabetes Mellitus (DM) stands out among non-communicable chronic diseases due to its high prevalence and impact on morbidity and mortality indicators at national and global levels. The world population with DM is currently estimated to be approximately 387 million, with an expectation of 471 million by 2035, and associated with the rapid demographic transition it generates an age pyramid with greater relative weight, especially among adults and older adults[1].

Studies show that diabetes affects 18% of older adults and 50% of people with type 2 DM are over 60 years of age. Moreover, diabetes in this population is related to a higher risk of premature death due to its association with other comorbidities and acute geriatric syndromes[2].

Thus, it is necessary to prioritize actions related to health promotion and complications prevention, making educational interventions essential in this context of care which favor empowering people with chronic conditions and consequently enhance functional capacity[3].

In addition, the multiprofessional health team should promote the development of self-care skills in order to make people with DM responsible for their treatment by modifying or maintaining healthy habits and strengthening self-confidence[4]. Therefore, self-care should be understood as a learned behavior and performed by the individual for their own benefit[5]. The evaluation of self-care actions of DM patients should be integrated with the care provided by health professionals. Implementing self-care action measurement instruments is a methodological tool which contributes to evaluating patients' responses to treatment, as well as enabling understanding and studying the observed problems[6].

Self-management education is essential for patients with diabetes, which should promote acquiring knowledge, skills and empowerment for self-care in order to improve clinical outcomes, health status and quality of life[7]. Intervention studies related to diabetes self-care establish a positive relationship with health promotion actions and maintenance of self-care actions in the adult population[8].

Self-care education activities are generally carried out by the primary care team and are aimed at making people more aware of their chronic health conditions in order to better manage them. Nurses are one of the health professionals who achieve good results as a facilitator of these educational activities for self-care[9].

However, there is a gap regarding studies which are exclusively conducted on older adults with DM[10-11]. In this sense, there is a need for studies conducted with this specific population, which will serve as a basis for future actions from the perspective of promoting self-care in primary health care.

Given the above, the objective of this study was to evaluate the efficacy of an educational self-care nursing intervention for older adults with DM.

METHOD

STUDY DESIGN

This is a quasi-experimental before-and-after study with two groups, namely: Control Group (CG) and Intervention Group (IG).

POPULATION

The study population consisted of older adult patients diagnosed with type 2 diabetes mellitus assisted in primary care units.

Inclusion criteria for the study were: being 60 years of age or older, having a diagnosis of DM and follow-up at the selected Primary Health Care Units (PHCU). Participants who had diseases and/or conditions with severe cognitive or functional impairment that prevented participation in the stages proposed by the study were excluded from the sample. Participants who did not attend all stages of the study were discontinued.

The sample was calculated using the formula to compare two means, with a margin of 10% for eventual losses. Thus, it was found that 54 older adults would be needed in each group, totaling 108 older adults.

DATA COLLECTION

The research was conducted in two UAPS of Fortaleza/ Ceará from April 2014 to January 2015. The selection of units was through a random draw, and equivalence between the groups was proven through the Marginal Homogeneity Test.

The study took place in three stages: in the first stage before the intervention data were collected from the IG and CG by a sociodemographic and clinical data form, followed by application of the adapted Brazilian version of the Summary of Diabetes Self-Care Activities Measure (SDSCA) (*Questionário de Autocuidado em Diabetes – QAD*)[12]. In the second stage, the educational intervention was performed with the IG, and in parallel the CG remained in conventional follow-up with consultations being held at the UAPS. In the third stage, participants from both groups were reevaluated regarding self-care by the QAD regarding clinical parameters.

In the clinical evaluation, capillary glycemia, blood pressure (BP), weight and height were verified, and then the Body Mass Index (BMI) was calculated. Capillary glycemia was randomly verified using the Accu-Check® glucometer. Normality was considered as values between 70 and 180 mg/ dl and altered when below 70 mg/dl and above 180 mg/dl[7].

A calibrated Premium® sphygmomanometer was used for the BP assessment along with the blood pressure verification technique and the participants who presented Systolic Blood Pressure (SBP) < 140 mmHg and Diastolic Blood Pressure (DBP) < 90 mmHg were classified as normotensive[13].

Weight was verified by a Tec 130 portable digital scale from Tech Line® Brazil and registered in kilograms (Kg). The participants were positioned standing, barefoot with lateral feet apart, erect, with their gaze fixed ahead. A tape

measure graduated in centimeters and tenth of centimeters fixed to the wall was used to measure the height with the participants positioned upright in anatomical position with their feet together, with the posterior surfaces of the heel, pelvic girdle, scapular girdle and occipital region in contact with the measuring instrument, and with their head parallel to the ground. The specific parameters for older adults were used in the BMI calculation, classifying them as underweight ($\leq$ 22 Kg/m^2); adequate or eutrophic (> 22 and < 27 kg/m^2); or overweight ($\geq$ 27 Kg/m^2)[14].

The QAD corresponds to a translated, adapted and validated version for the Brazilian culture of The Summary of Diabetes Self-Care Activities Measure (SDSCA)[15]. The instrument is composed of 18 items related to activities and behavior regarding the last 7 days addressing diabetes self-care activities, focused on general diet, specific diet, physical activity, glycemia monitoring, foot care, medication and smoking. A Likert scale is used in each item, which varies from 0 to 7, calculating the referenced percentage in each item. The average number of days for each evaluated item was used for data analysis.

Scientific initiation fellows and participants of the Older Adult Health research group (linked to the Nursing Department of the Universidade Federal do Ceará) were properly trained and qualified to participate in data collection through four workshops conducted by the researcher. Two took place in the Practice Laboratory of the undergraduate Nursing course, located in the Universidade Federal do Ceará facilities, and two in the UAPS. After training, the students participated in the first and third stages of the research, applying the socio-demographic and clinical data verification instruments, as well as participating in the logistics organization, contacting the participants and organizing the groups for the intervention.

In the second stage, the educational intervention with the IG was performed by the researcher based on the recommendations of the Ministry of Health Manual and the International Foot Consensus[16-17]. This step was accomplished in the premises of the Nursing Practice Laboratory of the Universidade Federal do Ceará, located near the UAPS. This laboratory has an air-conditioned environment and instruments necessary for the proposed practice. The chairs were arranged in a circle to facilitate eye contact and communication between the participants and the researcher. The intervention addressed diabetes treatment guidelines and foot care guidelines/demonstrations. Two serial albums were used to accomplish this: one on the general aspects of DM, which addressed the pathophysiology of the disease, pharmacological, non-pharmacological treatment and care regarding the complications of the disease[18]; and the other addressed foot care, entitled "Let's treat the foot with love and care" (*Vamos pegar no pé com amor e carinho*)[19].

The use of serial albums favored dialogue with the group in order to effect the educational nursing intervention in the sense of praxis action-reflection-action, subsidizing intermediations of knowledge and practices, as well as providing an exchange of experiences between participants. Along with the albums, an educational kit was used to demonstrate and reinforce knowledge about foot care, consisting of: scissors, towel, moisturizer, leg and foot mannequin.

The participants were allocated to 10 groups in which there were an average of five participants per group. The intervention lasted an average of 60 minutes, with a break of 20 minutes between DM content and foot care.

Educational work with groups is an alternative to care practices and favors the improvement of participants "both personally and professionally through valuing diverse knowledge and the possibility of creatively intervening in the health-disease process"[20].

Then, after 15 days from the date of the educational intervention, the researcher made telephone contact to accompany the older adult participants in order to answer questions and provide guidance on treatment and care about the content addressed in the intervention[21].

The third stage occurred 30 days after the educational intervention in the IG and CG. At this stage, reevaluation of self-care in diabetes was promoted through application of the QAD[12] and a new evaluation of the clinical parameters. This reassessment time was adopted based on a study which verified a change in knowledge and behavior of diabetes care[22].

DATA ANALYSIS AND PROCESSING

The McNemar test, the Marginal Homogeneity test and the Wilcoxon test were used in the intragroup analysis, while the chi-squared test (X^2), the Fisher test and the Fisher-Freeman-Halton test were used in the analysis between groups. Normality was verified in the quantitative variables by applying the Kolmogorov-Smirnov test and the Levene test was performed to verify the homogeneity of variances. The comparison of means between groups that presented normality was performed using the Student's t-test and the Mann-Whitney test was applied between groups that did not present normal distribution. A confidence level of 95% ($p < 0.05$) was used for all analyzes. The data were statistically analyzed by the Statistical Package for the Social Sciences (SPSS) version 20.0 program.

ETHICAL ASPECTS

The study was approved by the Ethics and Research Committee of the Universidade Federal do Ceará, according to opinion No. 562.666/2014 and to Resolution No. 466/12 of the National Health Council for research involving human beings. All users who agreed to participate signed the Informed Consent Form (ICF).

RESULTS

The study was disseminated by the UAPS teams and a larger number than expected in the sample was included due to the interest of the registered older adults from the UAPS to participate in the study. Thus, 150 older adults were initially included with 47 being excluded, making a total of 103 older adults subdivided into two groups: experimental (n = 53) and control (n = 50).

The average age of the 103 older adults (100%) was 68.86 (± 6.007) years, ranging from 60 to 88 years, 84 (81.6%) were female, and 54 (52.4%) were married. Participants had an average of 5.7 (± 4.235) years of formal education, with average individual and family incomes of R$874.38 (BRL) and R$1,458.86 (BRL), respectively.

Regarding clinical characteristics, the diagnosis time in DM averaged 9.8 years, ranging from 1 to 46 years of diagnosis, while 18 (17.5%) had complications related to DM; of these, five (4.9%) had foot problems, and 55 (53.4%) had systemic arterial hypertension. Regarding drug treatment, 94 participants (91.2%) were using oral antidiabetic drugs.

Considering the type of quasi-experimental research, it was deemed necessary to make the correlation between the IG and CG to verify homogeneity, relating them to socioeconomic, demographic and clinical variables. The IG and CG did not differ when correlated with sociodemographic and clinical variables, gender (p = 0.693), age (p = 0.183), marital status (p = 0.980), education (p = 0.006), religion (p = 0.309), individual income (p = 0.057), family income (p = 0.487), or time since diagnosis (p = 0.102).

Regarding clinical variables, there were no statistically significant values after the intervention (p <0.05), but they deserve to be highlighted since they presented reduction in both groups (IG and CG). There was a reduction in the mean capillary glycemia, systolic blood pressure (SBP), and diastolic blood pressure (DBP) values in the IG, while in CG there was a decrease in mean glycemia and BMI values (Table 1).

Table 1 – Distribution of means before and after Glycemia, SBP, DBP and BMI in IG and CG – Fortaleza, CE, Brazil, 2015.

Variables	IG (n = 53)			CG (n = 50)		
	Before Mean (±SD)	After Mean (±SD)	p*	Before Mean (±SD)	After Mean(±SD)	p*
Glycemia (mg/dl)	187.30 (73.93)	171.06 (87.83)	0.135	175.04 (79.0)	171.74 (70.34)	0.966
SBP (mmHg)	131.36 (15.17)	129.68 (15.38)	0.364	130.40 (13.24)	132.44 (18.67)	0.412
DBP (mmHg)	78.49 (7.65)	75.16 (11.79)	0.147	76.68 (10.0)	79.06 (16.97)	0.719
BMI (Kg/cm²)	27.26 (5.12)	27.12 (4.5)	0.915	28.22 (5.18)	28.01 (5.23)	0.555

Note: * Wilcoxon Test.

When evaluating self-care, the aspects which presented statistically significant values in the IG were the variables that addressed diet, including: following a healthy diet (p = 0.027), following dietary instructions (p = 0.013) and examining their feet (p = 0.012) (Table 2).

Table 2 – Mean distribution of the Diabetes Self-Care Questionnaire (QAD)*, before and after the educational intervention in the IG (n = 53) and CG (n = 50) – Fortaleza, CE, Brazil, 2015.

QAD* Items	Intervention Group (IG)			Control Group (CG)		
	Before Mean (±SD)	After Mean (±SD)	p**	Before Mean (±SD)	After Mean (±SD)	p**
Follow a healthy diet	4.58(2.91)	5.74(2.17)	0.027	4.80(2.68)	4.90(2.55)	0.922
Follow food instructions	4.32(2.88)	5.58(2.19)	0.013	4.58(2.80)	4.72(2.66)	0.818
Eat five or more servings of fruits and/or vegetables.	5.53(2.35)	5.85(2.18)	0.358	4.94(2.59)	5.40(2.17)	0.337
Eat high fat foods	2.83(2.82)	3.06(2.76)	0.685	2.78(2.95)	2.24(2.38)	0.333
Eat candy/sweets	1.42(2.23)	1.04(2.05)	0.258	1.20(2.33)	0.84(1.78)	0.354
Practice physical activity for at least 30 minutes daily	2.36(2.94)	2.98(2.82)	0.174	1.86(2.70)	2.18(2.67)	0.245
Perform specific exercise	1.87(2.84)	2.26(2.69)	0.271	1.30(2.29)	1.46(2.28)	0.361
Evaluate glycemia	2.42(2.81)	2.21(2.83)	0.400	1.40(2.22)	1.42(2.25)	0.930
Evaluate glycemia as recommended	2.32(3.02)	2.15(2.93)	0.618	1.10(1.91)	1.34(2.40)	0.727
Examine feet	4.94(2.95)	6.06(2.31)	0.012	3.62(3.33)	4.40(3.05)	0.620
Examine inside shoes before putting them on	4.77(3.18)	5.53(2.79)	0.172	4.50(3.37)	5.04(3.01)	0.145
Dry the intertoe spaces of the feet after washing them	5.85(2.45)	6.30(2.01)	0.199	3.74(3.45)	4.08(3.27)	0.270
Take DM medications as recommended	6.38(1.73)	6.58(1.63)	0.513	6.52(1.68)	6.60(1.37)	0.888
Take insulin injections as recommended	2.85(3.43)	2.91(3.38)	0.865	1.38(2.79)	1.10(2.55)	0.157
Take the indicated number of diabetes pills	6.21(2.09)	6.06(2.38)	0.715	6.52(1.68)	6.26(1.95)	0.473

Notes: * All questions from the QAD concerned the last 7 days; ** c²/Fisher test. a) Marginal Homogeneity Test. b) Wilcoxon Test.

DISCUSSION

This study evaluated the efficacy of a nursing educational intervention focused on diabetes self-care guidelines, and its main results had a positive effect as it favored improvement in the clinical parameters and adherence requirements, as well as the implementation of guidelines related to healthy eating focused on DM control and self-care of the feet.

Before-and-after studies conducted in the Slovak Republic and Taiwan which used educational activities obtained similar findings, in which there was a reduction in weight, BMI, BP and fasting glucose[10-11].

The reduction in BP values is a crucial and highly desired goal for reducing cardiovascular complications, renal diseases and retinopathy, but reaching the normal parameters required by current guidelines is still challenging[13,23]. The maintenance of BP in older adults is an important aspect to be intensified during follow-up consultations, considering that this parameter is difficult to control in this population due to the many comorbidities that they commonly have.

Regarding BMI, the findings are consistent with studies developed involving patients with diabetes, highlighting the striking change with a longer intervention time[23].

The control of glycemic parameters in older people with diabetes is more difficult to perform and requires a longer time for a significant improvement in the evaluated parameters, as it may be related to particular physiological factors of aging or other factors such as medication administration error, not taking medication, culture, dietary habits which are not consistent with the diet, among other factors[7].

The data found differ from results in educational interventions performed with patients with T2DM, which favored controlling glycemia, blood pressure and BMI[10]. Such a fact may be justified by the short time for reevaluating the parameters. Glycemia deserves even more prominence given that another limiting factor was that it was performed at random. Changes in glycemic control and other parameters in randomized studies such as BP and BMI were observed after 3 months of intervention[24]. Studies that resulted in these changes after 6 months of intervention were also observed[25].

It is noteworthy that the mean number of days related to self-care practices presented by the older adults of the IG after participating in the educational intervention was higher than the number of days presented in other studies. In a study conducted with diabetic patients on self-care with ulcers and lower limb amputations[26], it was found that the healthy diet had an average of 5.6 days, healthy orientation of 4.3 days, and foot examination of 6.2 days. In another study, it was noticed that there was an average score of 5.0 days in the healthy diet item, 3.7 days for the diet orientation and foot examination of 4.5 days[27].

There were significant changes in adherence to the healthy diet as in other studies. It was found that educational interventions performed on patients with diabetes favored positive attitudes towards treatment and disease control, especially regarding the follow-up of a healthy diet[10-11].

Investing in health education related to healthy eating during DM consultations is essential to prevent glycemic changes and maintain control of the disease, as well as investing in activities in operative groups, workshops and lectures, considering the characteristics of the individual such as age, education, time since diagnosis, psychosocial and cultural issues[7]. In a study conducted in Brazil[28], it was found that adherence to non-pharmacological measures to treat DM such as healthy eating represents one of the challenges for disease control, as such a self-care attitude can be influenced by sociodemographic and clinical characteristics, as well as subtracting the pleasure of eating what is desired, and financial issues. Therefore, the authors point out that the role of health professionals in understanding these variables and in the development of more effective educational strategies and interventions is important to combat these barriers, with group education activities being among them, which have potential to strengthen the bond between professionals and patients, and improvements in their clinical condition.

Regarding the foot examination, it was found that there was a significant behavioral change as there was an increase in the number of days in which participants began to examine their feet, which is relevant for preventing foot complications, as prescribed by the Ministry of Health[7]. In comparing the number of days in a study which used the QAD[29], it was noticed that the number of days of this study was higher. In a before-and-after study developed in South Korea for seven months, it was found that there was an increase in foot care after visits by nurses, in addition to adherence to drug and non-drug treatment, showing that regular long term education management may provide essential education to maintain self-management in DM patients[27].

There was an increase in the number of days in other evaluated aspects, but it was not statistically relevant since positive indications of behavioral changes were observed in the perspective of treatment for DM. This result may be justified by the fact that the change of behavior towards self-care requires more time and involves several aspects related to motivation, lifestyle, lack of family support, social, financial and cultural aspects, as well as particularities related to diabetes treatment, such as the lack of adherence to the guidelines and the therapeutic plan[16]. It is extremely important for professionals to identify and understand these situations in order to work to identify their related risk factors early and promote therapeutic planning which aims to overcome and achieve desirable results.

No item was statistically significant in the CG; thus, these aspects need to be reinforced during consultations held at the UAPS, as they are conducts which are provided for in the Ministry of Health Manual[16] and need to be intensified in future intervention research and in the performance of health professionals, in particular, nurses with older adult diabetes patients.

It should be highlighted the positive involvement of the older adult participants in this study, which favored the activities and requests for continuous actions from the

perspective of promoting self-care, in turn favoring the prevention of complications, as many reported that they had not participated in an activity which addressed the above mentioned subject, highlighting the prevention of diabetic foot and suggested implementation of this intervention as a routine in health services.

Regarding the study limitations, the educational intervention period is highlighted since studies point to the need for continuous and longitudinal development over a longer period to obtain satisfactory results related to behavioral change and clinical parameters regarding self-care in diabetes.

CONCLUSION

The performance of educational interventions in a group approach showed improvement in the aspects of healthy eating and foot care which were previously not promoted, as verified in the control group. This practice must be continuous in order to maintain this satisfactory result and to increase self-care, in which the intervention may directly interfere with the clinical aspects.

There are several advantages to this type of study, such as the involvement of the older adults, collective learning on foot care, and the older adults multiplying the information as they reported during the interventions that they would guide other older adults and family members with DM who were not present for the content addressed during the educational activity.

The importance of developing group activities by nurses focused on older adults in primary care is emphasized, especially for the prevention of disabilities and complications related to chronic diseases, in particular DM.

RESUMO

Objetivo: Avaliar a eficácia de uma intervenção educativa de enfermagem no autocuidado de idosos com Diabetes Mellitus. **Método:** Estudo quase-experimental com dois grupos, controle e intervenção, realizado com idosos que vivem com Diabetes Escitalopram, atendidos em Unidades de Atenção Primária à Saúde do município de Fortaleza/Ceará. A intervenção foi uma abordagem educativa grupal com orientações sobre o tratamento de diabetes e cuidado com os pés. Para a avaliação antes e depois do autocuidado utilizou-se do Questionário de Autocuidado em Diabetes. Foi considerado um nível de significância de 0,05. **Resultados:** Participaram 103 idosos. Depois da intervenção educativa houve aumento do autocuidado em diabetes relacionado aos aspectos: dieta saudável (p=0,027), orientação alimentar (p=0,013) e exame dos pés (p=0,012). **Conclusão:** A intervenção realizada promoveu de forma positiva mudanças comportamentais, favorecendo a adoção de hábitos saudáveis e a promoção do autocuidado em pacientes idosos com Diabetes Mellitus.

DESCRITORES

Diabetes Mellitus; Idoso; Autocuidado; Pé Diabético; Cuidados de Enfermagem; Educação em Saúde.

RESUMEN

Objetivo: Evaluar la efectividad de una intervención educativa de enfermería en el autocuidado de ancianos con Diabetes Mellitus. **Método:** Estudio cuasi-experimental con dos grupos, control e intervención, realizado con ancianos que viven con Diabetes Mellitus, atendidos en Unidades de Atención Primaria de Salud del municipio de Fortaleza/Ceará. La intervención fue un abordaje educativo de grupo con orientaciones acerca del tratamiento de diabetes y cuidados con los pies. Para la evaluación antes y después del autocuidado se utilizó el Cuestionario de Autocuidado en Diabetes. Fue considerado un nivel de significación de 0,05. **Resultados:** Participaron 103 personas mayores. Después de la intervención educativa hubo aumento del autocuidado en diabetes relacionado con los aspectos: dieta sana (p=0,027), orientación alimentaria (p=0,013) y examen de los pies (p=0,012). **Conclusión:** La intervención llevada a cabo promocionó de modo positivo cambios de comportamiento, favoreciendo la adopción de hábitos sanos y la promoción del autocuidado en pacientes mayores con Diabetes Mellitus.

DESCRIPTORES

Diabetes Mellitus; Anciano; Autocuidado; Pie Diabético; Atención de Enfermería; Educación en Enfermería.

REFERENCES

1. Whiting DR, Guariguata L, Weil C, Shaw J. IDF Diabetes atlas: global estimates of the prevalence of diabetes for 2011 and 2030. Diabetes Res Clin Pract. 2011;94(3):311-21. DOI: https://doi.org/10.1016/j.diabres.2011.10.029

2. Pereira DA, Costa NMSC, Sousa ALL, Jardim PCBV, Zanini CRO. The effect of educational intervention on the disease knowledge of diabetes mellitus patients. Rev Latino Am Enfermagem. 2012;20(3):478-85. DOI: http://dx.doi.org/10.1590/S0104-11692012000300008

3. Oliveira NF, Souza MCBM e, Zanetti ML, Santos MA. Diabetes Mellitus: desafios relacionados ao autocuidado abordados em Grupo de Apoio Psicológico. Rev Bras Enferm. 2011;64(2):301-7. DOI: http://dx.doi.org/10.1590/S0034-71672011000200013

4. Baquedano IR, Santos MA, Teixeira CRS, Martins TA, Zanetti ML. Factors related to self-care in diabetes mellitus patients attended at an emergency service in Mexico. Rev Esc Enferm USP [Internet]. 2010 [cited 2018 May 20];44(4):1017-23. Available from: http://www.scielo.br/scielo.php?pid=S0080-62342010000400023&script=sci_arttext&tlng=en

5. Denyes MJ, Orem DE, Bekel G. Self-care: a foundational science. Nurs Sci Q. 2001;14(1):48-54. DOI: http://dx.doi.org/10.1177/089431840101400113

6. Curcio R, Lima MHM, Alexandre NMC. Instrumentos relacionados ao diabetes mellitus adaptados e validados para a cultura brasileira. Rev Eletr Enf [Internet]. 2011 [citado 2018 maio 25];13(2):331-7. Disponível em: https://www.fen.ufg.br/revista/v13/n2/pdf/v13n2a20.pdf

7. Sociedade Brasileira de Diabetes. Diretrizes da Sociedade Brasileira de Diabetes: 2015-2016 [Internet]. São Paulo: SBD; 2016 [citado 2018 maio 25]. Disponível em: http://www.diabetes.org.br/profissionais/images/docs/DIRETRIZES-SBD-2015-2016.pdf

8. Macedo MML, Cortez DN, Santos JC, Reis IA, Torres HC. Adherence to self-care practices and empowerment of people with diabetes mellitus: a randomized clinical trial. Rev Esc Enferm USP. 2017;51:e03278. DOI: http://dx.doi.org/10.1590/S1980-220X201605030327

9. Mendes EV. O cuidado das condições crônicas na atenção básica à saúde: o imperativo da consolidação da estratégia de saúde familiar [Internet]. Brasília: OPAS; 2012 [citado 2018 maio 25]. Disponível em: http://bvsms.saude.gov.br/bvs/publicacoes/cuidado_condicoes_atencao_primaria_saude.pdf.

10. Chen MY, Huang WC, Peng YS, Guo JS, Chen CP, Jong MC, et al. Effectiveness of a health promotion program for farmers and fishermen with type-2 diabetes in Taiwan. J Adv Nurs. 2011;67(9):2060-7. DOI: https://doi.org/10.1111/j.1365-2648.2011.05678.x

11. Nemcová J, Hlinková E. The efficacy of diabetic foot care education. J Clin Nurs. 2014;23(5-6):877-82. DOI: https://doi.org/10.1111/jocn.12290

12. Michels MJ, Coral MHC, Sakae TM, Damas TB, Furlanetto LM. Questionário de Atividades de Autocuidado com o Diabetes: tradução, adaptação e avaliação das propriedades psicométricas. Arq Bras Endocrinol Metabol [Internet]. 2010 [citado 2018 maio 25];54(7):644-51. Disponível em: http://www.scielo.br/pdf/abem/v54n7/09.pdf

13. Sociedade Brasileira de Hipertensão; Sociedade Brasileira de Nefrologia. VII Diretrizes Brasileiras de Hipertensão Arterial. Arq Bras Cardiol [Internet]. 2016 [citado 2017 set 02];107(3):1-83. Disponível em: http://publicacoes.cardiol.br/2014/diretrizes/2016/05_HIPERTENSAO_ARTERIAL.pdf).

14. Brasil. Ministério da Saúde; Secretaria de Atenção à Saúde, Departamento de Atenção Básica. Orientações para a coleta e análise de dados antropométricos em serviços de saúde: norma técnica do sistema de vigilância alimentar e nutricional – SISVAN [Internet]. Brasília; 2011 [citado 2019 jul. 08]. Disponível em: http://bvsms.saude.gov.br/bvs/publicacoes/orientacoes_coleta_analise_dados_antropometricos.pdf

15. Toobert DJ, Hampson SE, Glasgow RE. The summary of diabetes self-care activities measure: results from 7 studies and a revised scale. Diabetes Care. 2000;23(7):943-50. DOI: https://doi.org/10.2337/diacare.23.7.943.

16. Brasil. Ministério da Saúde; Secretaria de Atenção à Saúde. Estratégias para o cuidado da pessoa com doença crônica: diabetes mellitus [Internet]. Brasília; 2013 [citado 2018 maio 25]. Disponível em: http://189.28.128.100/dab/docs/portaldab/publicacoes/caderno_36.pd

17. Bakker K, Apelqvist J, Schaper NC; International Working Group on Diabetic Foot Editorial Board. Practical guidelines on the management and prevention of the diabetic foot 2011. Diabetes Metab Res Rev. 2012;28 Suppl 1:225-31. DOI: 10.1002/dmrr.2253

18. Hammerschmidt KSA, Lenardt MH. Tecnologia educacional inovadora para o empoderamento junto a idosos com diabetes mellitus innovative educational technology for empowering the elderly with diabetes mellitus. Texto Contexto Enferm [Internet]. 2010 [cited 2018 May 25];19(2):358-65. Available from: http://www.scielo.br/pdf/tce/v19n2/18.pdf. DOI: http://dx.doi.org/10.1590/S0104-07072010000200018.

19. Brasil. Ministério da Saúde; Secretaria de Projetos Especiais de Saúde. Vamos pegar no pé: com amor e carinho. Brasília: Ministério da Saúde; 1998.

20. Dias VP, Silveira DT, Witt RR. Educação em saúde: o trabalho de grupos em atenção primária. Rev APS [Internet]. 2009 [citado 2018 out 03];12(2). Disponível em: https://aps.ufjf.emnuvens.com.br/aps/article/view/330

21. Becker TAC, Teixeira CRS, Zanetti ML. Nursing intervention in insulin administration: telephone follow-up. Acta Paul Enferm [Internet]. 2012 [cited 2018 May 25];25(spe1):67-73. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0103-21002012000800011&lng=en&tlng=en. DOI: http://dx.doi.org/10.1590/S0103-21002012000800011

22. Silva EF, Araújo ACT. Avaliação do estado nutricional e antropométrico após 30 dias de intervenção nutricional. e-RAC [Internet]. 2012 [citado 2018 out 01];2(1). Disponível em: http://www.computacao.unitri.edu.br/erac/index.php/e-rac/article/view/77

23. Benedetti TRB, Meurer ST, Morini S. Índices antropométricos relacionados a doenças cardiovasculares e metabólicas em idosos. Rev Educ Fis [Internet]. 2012 [citado 2018 mar 23];23(1):123-30. Disponível em: http://www.scielo.br/pdf/refuem/v23n1/a13v22n1.pdf

24. Iljaž R, Brodnik A, Zrimec T, Cukjati I. E-healthcare for diabetes mellitus type 2 patients: a randomised controlled trial in Slovenia. Zdr Varst [Internet]. 2017 [cited 2018 Mar 23];56(3):150-7. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5504540/

25. Kart Ö, Mevsim V, Kut A, Yürek , Altın AÖ, Yılmaz O. A mobile and web-based clinical decision support and monitoring system for diabetes mellitus patients in primary care: a study protocol for a randomized controlled trial. BMC Med Inform Decis Mak [Internet]. 2017 [cited 2018 Mar 23];17(1):154. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5707797/

26. Coelho ACM, Boas LCGV, Gomides DS, Foss-Freitas MC, Pace AE. Self-care activities and their relationship to metabolic and clinical control of people with diabetes Mellitus. Texto Contexto Enferm [Internet]. 2015 [cited 2018 Mar 23];24(3):697-705. Available from: http://www.scielo.br/pdf/tce/v24n3/0104-0707-tce-2015000660014.pdf

27. Ko IS, Lee TH, Kim GS, Kang SW, Kim MJ. Effects of visiting nurses' individually tailored education for low-income adult diabetic patients in Korea. Public Health Nurs. 2011;28(5):428-37. DOI: https://doi.org/10.1111/j.1525-1446.2011.00941.x

28. Torres HC, Souza ER, Lima MHM, Bodstein RC Educational intervention for self-care of individuals with diabetes mellitus. Acta Paul Enferm [Internet]. 2011 [cited 2019 July 09];24(4):514-9. Available from: http://www.scielo.br/pdf/ape/v24n4/en_a11v24n4.pdf.

29. Souza JD, Baptista MHB, Gomides DS, Pace AE. Adherence to diabetes mellitus care at three levels of health care. Esc Anna Nery [Internet]. 2017 [cited 2018 Mar 23];21(4). Available from: http://www.scielo.br/pdf/ean/v21n4/1414-8145-ean-2177-9465-EAN-2017-0045.pdf