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Evaluation of group education strategies and telephone intervention for type 2 diabetes*

Avaliação das estratégias de educação em grupo e intervenção telefônica para o diabetes tipo 2

Evaluación de las estrategias de educación grupal e intervención telefónica para la diabetes tipo 2

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ABSTRACT

Objective: To evaluate group education strategies and telephone intervention regarding the variables empowerment, self-care practices, and glycemic control of people with diabetes. **Method:** Clinical trial with eight randomized *clusters*, conducted between 2015 and 2016, with 208 users with type 2 diabetes *mellitus* allocated for group education, telephone intervention, or control group. Sociodemographic data, glycated hemoglobin, empowerment, and self-care practices were collected. **Results:** The user mean age was of 63.5 years (SD = 8.9 years), with the participation of 124 women, which amounts to 59.6% of these users. The strategies led to a statistically significant reduction in the levels of glycated hemoglobin ($p < 0.001$). The telephone intervention was also observed to present statistically significant results regarding self-care practices ($p < 0.001$) and empowerment in diabetes ($p < 0.001$) when compared to group education. **Conclusion:** The telephone intervention presented statistically significant results for empowerment and practices of self-care when compared to group education. Brazilian Registry of Clinical Trials (*Registro Brasileiro de Ensaios Clínicos*): RBR-7gb4wm.

DESCRIPTORS

Health Education; Self Care; Self Efficacy; Diabetes Mellitus; Nursing; Clinical Trial.

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INTRODUCTION

Type 2 diabetes *mellitus* (T2DM) is associated to unhealthy lifestyles, such as inappropriate nutrition and sedentarism[1]. Brazil is the fourth country worldwide in number of cases, with over 12.5 million people diagnosed in the age group from 20 to 79[2]. The high prevalence of T2DM reinforces the need for implementing strategies with an approach focused on the individual, capable of promoting the development of self-care practices, such as physical activity and a healthy nutrition plan[3].

Diabetes education strategies based on the empowerment approach may promote the development of self-care practices, since these account for the needs, objectives, and experiences of people, so as they can development their autonomy for making decisions related to the management of their health condition[3-4]. People with type 2 diabetes *mellitus* who are actively involved in the process of decision-making and who have their necessities and preferences observed are more likely to take responsibility for their health conditions[5-6].

Among the education approaches for empowerment and for diabetes self-care practices pointed by Brazilian and international literature, group education and telephone intervention are noteworthy. Such strategies have presented effective results concerning self-care practices, knowledge, psychological attitude, empowerment, and change of behavior concerning glycemic control[7-12]. When based on empowerment, such strategies are focused on dialogic, problematization, construction of knowledge and skills and development of autonomy, aiming at conducting self-care practices[13].

Group education is characterized as a space for sharing knowledge and exchanging experiences among people with the same chronic condition, contributing to the identification and management of barriers for self-care practices[5,10,13]. Telephone intervention, by its turn, is considered a low-cost educational practice that contributes to the access of information to perform a personalized follow-up of people with diabetes, favoring the educational process for the practice of self-care and glycemic control[6,11,14-16].

Group education may be considered a diabetes education strategy disseminated both in Brazil and worldwide; however, telephone intervention is little adopted in Brazil in the context of Primary Health Care (PHC). Even though its use in care of people with T2DM is still incipient, its application in scientific research has been showing major benefits[6,14-15].

In face of this, the objective of this study was to compare group education and telephone intervention regarding the variables empowerment, self-care practices, and glycemic control of people with type 2 diabetes *mellitus*.

METHOD

Study design

This is a clinical trial of the randomized *cluster* type conducted with people with T2DM of eight Basic Health Units (BHU) of the East Health District of Belo Horizonte city, in the state of Minas Gerais, Brazil, from 2015 to 2016.

Population and selection criteria

The sample was composed of 208 participants with a T2DM diagnosis, aged 18 to 79, who participated in the research project *"Evaluation of the diabetes empowerment program in Primary Health Care"* and were inserted in the education strategies telephone intervention and group education.

Sample definition

The sample size was determined through a calculation performed by a computer program. The participants were distributed into eight BHU, considered *clusters,* and were randomly allocated.

The randomization was used to allocate eight UBS from which the sample was extracted. Four BHU comprised the experimental group (n = 119 people with T2DM) and four formed the control group (n = 89 people with T2DM). Subsequently, the experimental group was randomly subdivided so that the users of two BHU (n = 57 people with T2DM) would receive group education and users of the other two BHU (n = 62 people with T2DM) would receive education through telephone intervention. It was subsequently verified that the comparison groups were homogeneous regarding education level and the values of glycated hemoglobin.

People who did not obtain minimal participation in the strategies of group education and telephone intervention were considered as loss to follow-up. There was no loss to follow-up between the number of baseline participants and the final moment, since one of the inclusion criteria was finishing project participation.

Description of the education program

The empowerment program of T2DM lasted for 12 months and involved the strategies group education and telephone intervention. By the end of the educational program, the study participants were compared with the control group participants who received only the habitual care conducted by health services.

Group education occurred in phases encompassing times T0, T1, T3, T6, T9, and T12. Times T1 to T9 corresponded to the cycles 1, 2, 3, and 4, referring to the period in which the participants received the group education strategy. Each cycle was composed of two to three meetings with one week gap. Each meeting was conducted in the respective health units, had a mean duration of two hours, and had the mean participation of 10 people with T2DM and two professionals, in general one nurse and one nutritionist, for conducting the intervention. The group education consisted of ludic and interactive activities which approached the themes healthy nutrition, practice of physical activity, and feelings that

influenced adherence to self-care practices, in addition to planning goals for people with diabetes.

For the development of these groups, scripts were elaborated according to established themes and based on the Behavior Change Protocol[16]. The group strategy aimed at encouraging participants to elaborate an individualized target plan to improve empowerment, self-care practices and, consequently, glycemic control. It should be emphasized that, between each of the three intervals from one cycle to another, the participants would receive a telephone call characterized as telephone monitoring, whose objective was to keep in touch with the participants and answering questions about the observation of the target plan.

The telephone intervention, similarly to the group education strategy, encompassed times T0, T1, T3, T6, T9, and T12. Also, in this strategy, times T1 to T9 corresponded to the cycles 1, 2, 3, and 4[15], referring to the periods of conduction of the education strategy. The telephone intervention was conducted by a nurse with the support of a nutritionist. The telephone calls were performed from the School of Nursing of *Universidade Federal de Minas Gerais* and lasted a mean of 25 minutes.

The telephone intervention was divided into four cycles with three-month intervals. In the first cycle, people with T2DM participated in a presential meeting and received a telephone call. In the second and third cycles, each participant received two telephone interventions. In the fourth cycle, three telephone interventions were conducted, totaling eight telephone contacts with each participant.

The education strategy used the Compasso protocol and the five steps for the elaboration of the target plan[15]. This protocol aims to help health professionals, through telephone intervention, to develop and follow the management of self-care practices of people with diabetes. As in group education, in the three intervals between the cycles, people received a telephone call containing orientation on how to follow the target plan.

The participants of the control group received the regular care offered by BHU professionals and a booklet with orientation on diabetes, participating in education practices and clinical care offered by the services.

Data collection

The study has analyzed sociodemographic (sex, age, marital status, education, profession, and monthly income) and clinical (glycated hemoglobin laboratory exams) variables, as well as levels of self-care practices and empowerment of people with diabetes. Three outcomes of interest were used: empowerment, self-care practices, and glycated hemoglobin.

To measure the levels of self-care practices, the Questionnaire of Self-care of Diabetes *Mellitus* (*Questionário de Autocuidado do Diabetes Mellitus* – ESM) was used; this comprises eight multiple choice questions, whose total score ranges from zero to eight[17].

The level of empowerment of the participant was measured through the Brazilian version of the instrument Diabetes Empowerment Scale – Short version (DES-SF), named "*Escala de Autoeficácia em Diabetes – Versão curta*" (EAD-VC), whose objective is to evaluate the psychosocial self-efficacy of people with T2DM for the management of self-care practices. The total score ranges from one to five points[18].

The information of group education, telephone intervention, and of the control group were collected from August 2015 to September 2016[15]. The collected data were registered in the online tool *eSurv*, organized into spreadsheets in *Excel* version *Microsoft Windows* 2013.

Data treatment and analysis

The collected data were analyzed in the statistical programming environment R.[19]

To verify the homogeneity of the analysis groups in relation to the baseline sociodemographic variables, the Kruskal-Wallis test was employed to compare the medians in the case of quantitative variables whose distribution could not be considered normal. In addition, chi-squared and Fisher's exact test were used to compare proportions.

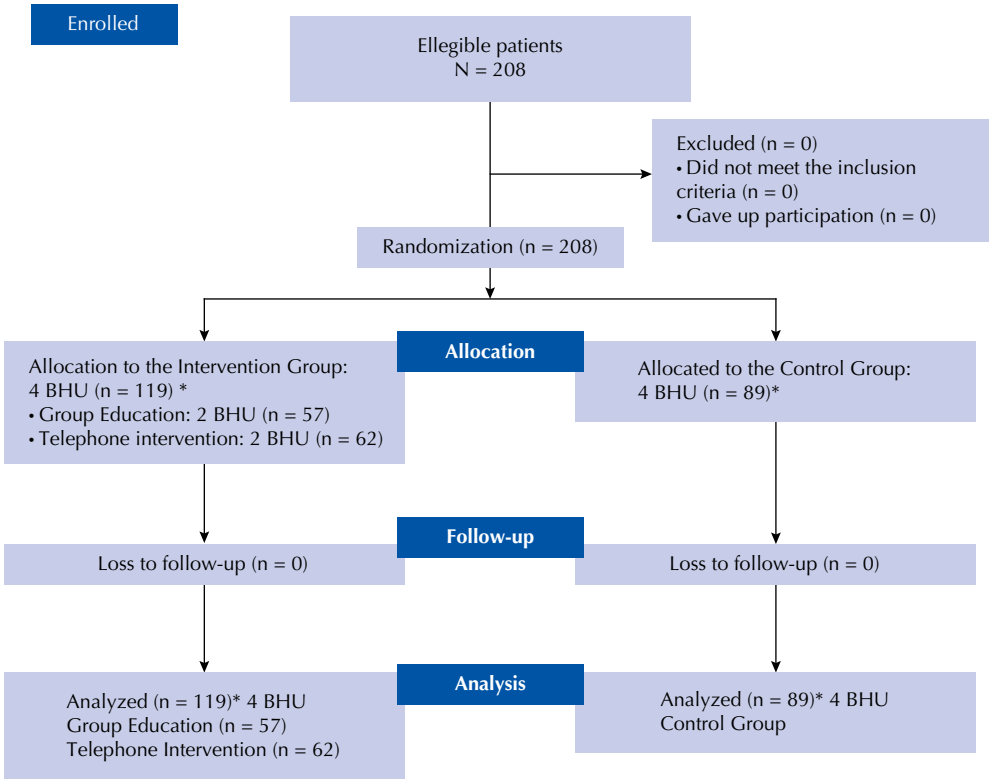
Paired t-Student or Wilcoxon (to compare means or medians) tests were used to evaluate the effectivity of the strategies of each group, respectively, in case of normality or non-normality. Finally, the comparisons between the strategies were performed through Kruskal-Wallis and Dunn (for multiple comparisons) tests when the supposition of data normality could not be considered valid. For each outcome (self-care practices, empowerment, and glycated hemoglobin), the effect of the strategies was defined as the difference between its values in the final period and in the initial period (Δ) divided by the initial value. The effect values were multiplied by 100 to transform them into percentual variations. The evaluation of supposition of data normality was conducted through Shapiro-Wilk test. A 5% significance level was considered for all the analyses.

Ethical aspects

This project was approved by the Ethics Committee of *Universidade Federal de Minas Gerais* (UFMG) with CAAE 11938313.0.0000.5149 and is registered in the Brazilian Registry of Clinical Trials (*Registro Brasileiro de Ensaios Clínicos*) RBR-7gb4wm.

RESULTS

As defined by the CONSORT guidelines[20], Figure 1 presents a flowchart of the progress of clusters and people with T2DM during the phases of the randomized clinical trial. After randomization, the strategies of the intervention group (IG), group education, and telephone intervention, obtained 57 and 62 people, respectively. The control group (CG) comprised 89 people.



* There were no losses between the initial and final values, since one of the inclusion criteria was to have concluded participation in the project
Source: Elaborated by the author and adapted from Schulz et al.[20]

Figure 1 – Flowchart of the progress of clusters and people with T2DM during phases of the randomized clinical trial.

People with T2DM who completed study participation amounted to 208, out of which 89 (42.7%) composed the control group sample; 57 (27.4%), group education; and 62 (29.8%), telephone intervention (Table 1). Regarding sociodemographic characteristics, the mean age was observed to be 63.5 years (SD = 8.9 years) and there was more participation by females, who amounted to 124 (59.6%); also, 131 participants (63.0%) had a partner. Although illiterate people were not counted, most participants had not completed primary education, totaling 135 (64.9%), in addition to 157 (75.5%) participants who reported having no profession. The mean income was of approximately one minimum wage and a half. Concerning health status, the time of T2DM diagnosis was observed to vary; however, the group with the most participants reported having this health condition for longer than 10 years, totaling 82 (39.4%). Other comorbidities were also identified: 157 people (75.5%) reported having at least one other chronic health condition (Table 1).

To verify the effect of the educational strategies, participant homogeneity was analyzed from the sociodemographic characteristics collected in the baseline. All study groups (control group, group education, and telephone intervention) were considered homogeneous during the baseline ($p > 0.05$) (Table 1).

Table 1 – Description of sociodemographic and clinical variables of people with T2DM, participants of the control group (CG), group education (GE), and telephone intervention (TI) in the start of the study in Primary Health Care – Belo Horizonte, MG, Brazil, 2017.

Variable	Total (n = 208)	CG (n = 89)	GE (n = 57)	TI (n = 62)	*P*
Age in years (mean±SD)	63.5 ± 8.9	63.7 ± 9.1	63.4 ± 9.7	63.4 ± 7.9	0.9550†
Sex (n (%))					
Male	84 (40.4)	36 (40.4)	25 (43.9)	23 (37.1)	0.7541‡
Female	124 (59.6)	53 (59.6)	32 (56.1)	39 (62.9)	
Education (n (%))					
Illiterate	12 (5.8)	7 (7.9)	2 (3.5)	3 (4.8)	0.4047§

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Variable	Total (n = 208)	CG (n = 89)	GE (n = 57)	TI (n = 62)	*P*
Primary ed. Incomplete	135 (64.9)	60 (67.4)	33 (57.9)	42 (67.8)	
Primary ed. Complete	18 (8.7)	7 (7.9)	4 (7.0)	7 (11.3)	
Incomplete secondary education	8 (3.8)	4 (4.5)	3 (5.3)	1 (1.6)	
Complete secondary education	23 (11.0)	6 (6.7)	12 (21.0)	5 (8.1)	
Incomplete higher education	1 (0.5)	0 (0.0)	0 (0.0)	1 (1.6)	
Complete higher education	11 (5.3)	5 (5.6)	3 (5.3)	3 (4.8)	
Marital status (n (%))					
With partner	131 (63.0)	57 (64.0)	36 (63.2)	38 (61.3)	0.9418‡
No partner	77 (37.0)	32 (36.0)	21 (36.8)	24 (38.7)	
Profession (n (%))					
Active	51 (24.5)	22 (24.7)	15 (26.3)	14 (22.6)	0.8926‡
Inactive	157 (75.5)	67 (75.3)	42 (73.7)	48 (77.4)	
Time with the Disease (n (%))					
0 to 5 years	67 (32.2)	33 (37.1)	12 (21.1)	22 (35.5)	0.3375‡
6 to 10 years	59 (28.4)	23 (25.8)	19 (33.3)	17 (27.4)	
Over 10 years	82 (39.4)	33 (37.1)	26 (45.6)	23 (37.1)	
Comorbidities (n (%))					
Yes	157 (75.5)	64 (71.9)	47 (82.5)	46 (74.2)	0.3384‡
No	51 (24.5)	25 (28.1)	10 (17.5)	16 (25.8)	
Income in m.w.* (mean±SD)	1.49±0.9	1.52±1.1	1.53±0.9	1.42±0.6	0.7777†
HbA1c		8.0 (5.1-14.2)	7.7 (5.4-11.9)	8.1 (5.6-13.7)	0.2077†
ESM		3.6 (1.0-5.9)	3.5 (1.5-5.6)	3.5 (1.8-5.4)	0.8475†
EAD-VC		31.0 (23-37)	31.0 (26-40)	31.0 (14-35)	0.2627†

*: minimum wages; †: *Kruskal-Wallis test*; ‡: Chi-squared Test; §: Fisher's Exact Test; HbA1c: Glycated Hemoglobin; ESM: Diabetes *Mellitus* Self-care Questionnaire; *Escala de Autoeficácia em Diabetes - Versão curta* (EAD-VC).

As to respond this study's objectives, analyses comparing the variables in the baseline after the development of education strategies regarding empowerment, self-care practices, and glycated hemoglobin were conducted (Table 2).

Table 2 – Median values (minimum and maximum) and/or mean (standard deviation) for glycated hemoglobin (HbA1c) and answers to the questionnaires ESM and EAD-VC and intragroup median comparison between baseline (before) and after the intervention (after) of people with T2DM in Primary Health Care – Belo Horizonte, MG, Brazil, 2017.

Variable	Control Group			Group Education			Telephone Intervention		
	Before	After	*p*	Before	After	*P*	Before	After	*P*
HbA1c	8.0 (5.1-14.2)	8.3 (5.5-16.3)	0.132*	7.7 (5.4-11.9)	6.9 (5.2-11.2)	0.003*	8.1 (5.6-13.7)	7.3 (5.5-12.4)	< 0.001*
ESM	3.6 (1.0-5.9)	2.5 (0.8-5.2)	< 0.001*	3.5± 0.99	3.4± 1.1	0.786†	3.6± 0.973.56	4.2± 1.146.21	< 0.001†
EAD-VC	31.0 (23-37)	30.0 (21-40)	0.836*	31.4± 2.9	32.2± 3.3	0.211†	31.0 (14-35)	34.0 (24-39)	< 0.001*

HbA1c: Glycated Hemoglobin; ESM: Diabetes *Mellitus* Self-care Questionnaire; *Escala de Autoeficácia em Diabetes - Versão* curta (EAD-VC); *: *Wilcoxon Test*; †: Paired t Test.

After the intervention, HbA1c was noticed to have been reduced in both education interventions. However, when the variables empowerment and self-care practices are analyzed, only telephone intervention obtained a significant result. There was no change in the values of glycated hemoglobin and empowerment in the control group.

Nonetheless, the variable self-care practices has presented a remarkable reduction.

A different analytic perspective was the basis for an intergroup comparison of the results for glycated hemoglobin and answers to the ESM and EAD-VC questionnaires of the participants for each study group: group education, telephone intervention, and control group (Table 3).

Table 3 – Intergroup comparison of the relative effect in the glycated hemoglobin (HbA1c) and in answers to the questionnaires ESM and EAD-VC between baseline (before) and after the intervention (after) of people with T2DM in Primary Health Care – Belo Horizonte, MG, Brazil, 2017.

Variable	Relative Effect (median, %)			TI x GE x CG	CG x GE	CG x TI	GE x TI
	CG‡	GE§	TI‖				
	n = 89	n = 57	n = 62	*p**	*p*†	*p*†	*p*†
HbA1c	2.96	-2.90	-8.80	< 0.001	0.0050	< 0.0010	0.150
ESM	-21.00	0	13.72	< 0.001	0.0002	< 0.0010	0.022
EAD-VC	-2.94	0	9.38	0.001	0.6060	0.0004	0.027

HbA1c: Glycated Hemoglobin; ESM: Diabetes *Mellitus* Self-care Questionnaire; EAD-VC: *Escala de Autoeficácia em Diabetes - Versão curta*; **Kruskall-Wallis* test; †Dunn Test with p-values adjusted by Bonferroni correction; ‡: Control group; §: Group education; ‖: Telephone intervention.

An individual analysis of the scores shows that telephone intervention presented a better result when compared to the strategies group education and control group (Table 3).

On the other hand, the results presented in Table 3 show that, when only the variable glycated hemoglobin is considered between group education and telephone intervention, both strategies achieved positive scores.

DISCUSSION

This study has aimed at evaluating the effects of group education, telephone intervention, and control group in the variables empowerment, self-care practices, and glycated hemoglobin in people with T2DM. Concerning self-care and empowerment, the telephone intervention had the best result. Both strategies are nonetheless emphasized to have been positive for glycated hemoglobin.

The group receiving group education has presented a significant improvement in clinical variable – glycated hemoglobin – after the period of intervention. However, such improvement was not achieved when the variables self-care practices and empowerment were analyzed. Although there was no statistical difference for the clinical variable glycated hemoglobin in the group education, participants were observed to have a value for glycated hemoglobin close to the reference value from baseline. However, the mean for glycated hemoglobin has decreased between initial and final times, achieving a value under 7%, and meeting what is suggested by the American Diabetes Association[21].

Although the group receiving group education has not shown a significant improvement in all the variables, studies have been showing that this strategy provides plenty of benefits in T2DM treatment, such as improvements in self-care practices and adoption of healthy nutrition and physical activity, in addition to promoting an increase in knowledge and providing better confrontation of barriers related to this chronic condition[3,22-23].

The group which received the telephone intervention has presented a significant improvement in all clinical variables: glycated hemoglobin, self-care practices, and empowerment.

Many studies have also described, in agreement with the presented results, the benefits of telephone intervention. According to the literature, this is an innovative strategy, which can promote an effective form of communication between the professional and the person with T2DM, since it enables dialogue, reflection, and, as a consequence, more co-responsibility of the person with the chronic condition regarding their own health[15,24-26].

The effectivity of the telephone intervention was identified from the glycated hemoglobin exam. Such result corroborates studies about the effectivity of the intervention which, although recent, has been achieving many satisfactory results[27-28].

An improvement in self-care practices was effectively achieved through telephone intervention. A randomized clinical trial which aimed at evaluating the capacity of telephone-based pharmaceutic services provided to rural area inhabitants who presented T2DM diagnosis and arterial hypertension, conducted in Arizona (USA), concluded that telephone support has a potential for improving self-care practices. This study has shown that, through telephone calls, it is possible to make recommendations on nutrition, physical activity, correct use of medication, foot care, and even teaching how to identify hyperglycemia and hypoglycemia symptoms[29].

The empowerment variable, analyzed in the telephone intervention, has increased by the end of the practice. A systematic review on factors related to the management of T2DM with an emphasis on health education points out telephone intervention as one of the strategies capable of stimulating an active participation of the person in all phases of self-care. This study has also shown that education strategies, including telephone intervention, when based on the

empowerment approach, may favor learning related to the chronic condition, improve autonomy, favor the development of positive attitudes and provide important changes in lifestyle for controlling T2DM[30].

This study's control group has received the traditional follow-up offered by BHU. Such participants, however, did not present an improvement in the variables empowerment and glycated hemoglobin and self-care practices had a statistically significant worsening. Such results may be justified by the need for confronting the barriers of diabetes, which leads to a worsened glycemic control and an increase in T2DM complications[31].

The analysis of the intergroup comparison of results of glycated hemoglobin, self-care practices, and empowerment has provided a reinforcement of these results, reaffirming that telephone intervention was a better strategy than the tactics of group education and control group, even if the participants who received group education had achieved positive results for glycated hemoglobin.

This study presents as a limitation the impossibility of guaranteeing that users, both in the intervention group which participated in group education and telephone intervention and the control group, did not receive an external stimulus for change of behavior. Another possible limitation refers to the absence of an analysis of medication therapy in the participants during the study.

CONCLUSION

The telephone intervention has shown statistically significant results when compared to group education concerning the analyzed variables, mainly regarding self-care practices and empowerment. Both strategies are nonetheless emphasized to have presented positive results for glycated hemoglobin.

RESUMO

Objetivo: Avaliar as estratégias de educação em grupo e intervenção telefônica em relação às variáveis empoderamento, práticas de autocuidado e controle glicêmico da pessoa com diabetes. **Método:** Ensaio clínico com oito *clusters* randomizados, realizado entre 2015 e 2016, com 208 usuários com diabetes *mellitus* tipo 2 alocados para educação em grupo, intervenção telefônica ou grupo controle. Foram coletados dados sociodemográficos, hemoglobina glicada, empoderamento e práticas de autocuidado. **Resultados:** A média de idade dos usuários era de 63,5 anos (DP = 8,9 anos), com participação de 124 mulheres, equivalente a 59,6% desses usuários. As estratégias levaram a uma redução estatisticamente significante nos níveis de hemoglobina glicada (p < 0,001). Observou-se também que a intervenção telefônica apresentou resultados estatisticamente significantes quanto às práticas de autocuidado (p < 0,001) e ao empoderamento em diabetes (p < 0,001) quando comparada à educação em grupo. **Conclusão:** A intervenção telefônica apresentou resultados estatisticamente significantes de empoderamento e de práticas de autocuidado se comparada à educação em grupo. Registro Brasileiro de Ensaios Clínicos RBR-7gb4wm.

DESCRITORES

Educação em Saúde; Autocuidado; Autoeficácia; Diabetes Mellitus; Enfermagem; Ensaio Clínico.

RESUMEN

Objetivo: Evaluar las estrategias de educación grupal e intervención telefónica en relación con las variables empoderamiento, prácticas de autocuidado y control glucémico en personas con diabetes. **Método:** Ensayo clínico con ocho *clusters* aleatorizados realizado entre 2015 y 2016 con 208 pacientes con diabetes *mellitus* tipo 2 asignados a educación grupal, intervención telefónica o grupo control. Se recogieron datos sociodemográficos, de hemoglobina glicosilada, de empoderamiento y de prácticas de autocuidado. **Resultados:** La edad media de los pacientes era de 63,5 años (DT = 8,9 años) y 124 de ellos eran mujeres, lo que equivale al 59,6% del total. Las estrategias condujeron a una reducción estadísticamente significativa de los niveles de hemoglobina glicosilada (p < 0,001). También se observó que la intervención telefónica ha presentado resultados estadísticamente significativos respecto a las prácticas de autocuidado (p < 0,001) y al empoderamiento en diabetes (p < 0,001) cuando se comparaba con la educación grupal. **Conclusión:** La intervención telefónica mostró resultados estadísticamente significativos en cuanto a las prácticas de empoderamiento y autocuidado en comparación con la educación en grupo. Registro Brasileño de Ensayos Clínicos RBR-7gb4wm.

DESCRIPTORES

Educación en Salud; Autocuidado; Autoeficacia; Diabetes Mellitus; Enfermería; Ensayo Clínico.

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