OBJN
ONLINE BRAZILIAN JOURNAL OF NURSING
ISSN: 1676-4285

ORIGINAL

The effect of nursing consultation on the promotion of safe practices in insulin therapy: a retrospective study

Efeito da consulta de enfermagem na promoção de práticas seguras em insulinoterapia: estudo retrospectivo

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Submission: 01/09/2022
Approved: 09/28/2022

ABSTRACT

Objective: To analyze the correlation between nursing consultation and the execution of self-care actions and safe practices in insulin therapy by people with diabetes. **Method**: Observational, retrospective, and analytical study. Sociodemographic and clinical characteristics and correct answers in a questionnaire with 16 items on safe practices in insulin therapy, applied in the first and second nursing consultations, were analyzed. **Results**: There was a significant increase in the number of correct answers in the questionnaire regarding aspects related to insulin therapy in the second consultation (14.22±1.59) compared to the first (9.24±3.13) ($p<0.001$), suggesting improvement in self-care and adherence to safe practices in insulin therapy. **Conclusion**: There was an improvement in the execution of self-care actions and safe practices in insulin therapy after the nursing consultations, showing that this intervention effectively promotes adequate insulin treatment.
Descriptors: Diabetes Mellitus; Health promotion; Nursing services; Self care.

RESUMO

Objetivo: Analisar a correlação entre a consulta de enfermagem e o cumprimento de ações de autocuidado e práticas seguras em insulinoterapia por pessoas com diabetes. **Método:** Estudo observacional, retrospectivo e analítico. Analisaram-se características sociodemográficas e clínicas e acertos em questionário com 16 itens sobre práticas seguras em insulinoterapia, aplicado na primeira e segunda consulta de enfermagem. **Resultados:** Constatou-se aumento significativo de acertos no questionário nos aspectos relacionados à insulinoterapia na segunda consulta (14,22±1,59), em comparação com a primeira (9,24±3,13) ($p<0,001$), sugerindo melhoria do autocuidado e da adesão às práticas seguras em insulinoterapia. **Conclusão:** Houve melhora do cumprimento de ações de autocuidado e práticas seguras em insulinoterapia, após as consultas de enfermagem, mostrando que essa intervenção é eficaz para promoção do tratamento insulínico adequado.
Descritores: Diabetes Mellitus; Promoção da Saúde; Serviços de Enfermagem; Autocuidado.

INTRODUCTION

Diabetes Mellitus (DM) is a group of endocrine and metabolic disorders characterized by hyperglycemia that, when not controlled, can lead to numerous micro and macrovascular complications[1]. The disease is considered a relevant public health problem of the 21st century due to its high incidence and prevalence at a global level, affecting 436 million adults worldwide. In Brazil, DM affects 16.8 million people[2].

For effective self-care in diabetes, education strategies are needed for greater participation of people with diabetes in health services, based on a therapeutic approach that aims to prevent or delay the onset of chronic complications, helping to promote health and good control of the disease[3]. From this perspective, insulin therapy is highly relevant for diabetes treatment. Inadequate and unsafe insulin self-administration practices can directly interfere with metabolic control, causing damage to the individual's health[1]. Therefore, regarding diabetes education, the role of nurses stands out as professionals who conduct training on safe practices in insulin therapy and

develop interventions to improve the knowledge of patients, family members, and caregivers about the disease and self-care[4].

Insulin is considered a Potentially Dangerous Medicine (PDM). Medications in this category present an increased risk of significant damage due to failure to use[5]. In this way, the nurse must be trained and updated on the management of this medication, thus being able to educate the patient about insulin therapy. This prerequisite is essential for quality and safe care. Investigations in this area make it possible to elucidate the potential of the nursing consultation on promoting safe practices in insulin therapy and redirecting care and educational nursing practices for people with diabetes. This study aimed to analyze the correlation between nursing consultation and the execution of self-care actions and safe practices in insulin therapy by people with diabetes.

METHOD

Design, location, and period of study

An observational, retrospective, and analytical study of secondary data was carried out with data from 87 people diagnosed with DM, assisted in an endocrinology and diabetes service that is considered a tertiary reference for the care of people with DM in Fortaleza, Ceará, Brazil. The service comprises a multidisciplinary team formed by endocrinologists, nurses, nutritionists, physiotherapists, and psychologists. The study design was based on the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) initiative.

The nursing consultation for patients with DM is carried out in the institution selected for the study by five nurses specialized in diabetes and eight resident nurses, with an average duration of 50 minutes, and includes an educational approach focused on safe practices for the preparation and administration of insulin and glycemic monitoring. The nursing consultation is guided by a checklist contained in the institution's care protocol based on the recommendations of the Brazilian Society of Diabetes[1]. The frequency of consultations is three to six months.

Initially, the authors intended to collect data from a larger and random sample, which was unfeasible due to the COVID-19 pandemic. Thus, the non-probabilistic convenience sampling was adopted, and the collection was restricted to medical records that contained records of nursing consultations carried out in the last two years (2019 and 2020). The data collection took place from October to November 2020 and was carried out by nurses and residents after a pilot test to assess the applicability of the data collection instrument. The pilot testing did not result in changes in the instrument's shape or structure.

Inclusion and exclusion criteria

The following inclusion criteria were established: age of 18 years or older, clinical diagnosis of DM, being on insulin therapy, and having at least two nursing consultations recorded in medical records. The medical records containing incomplete data regarding the registration of technical activities performed, tracking of complications, exams, and relevant aspects addressed in the consultation, and outdated medical records were excluded.

Study protocol

The data collection took place using two instruments: 1) Sociodemographic and clinical characterization form and 2) Instrument with items on insulin therapy, applied in the first nursing consultation (before any educational intervention) and the second consultation (applied after the technical activities, the tracking of complications and the recording of exams). The two instruments were developed by one of the study's authors.

The second instrument considered the guidelines of the Brazilian Society of Diabetes[1] regarding insulin therapy and was created using a checklist format with two response options: "right" and "wrong". This instrument contains 15 items that cover the following aspects: storage, transport, bottle hygiene, aspiration order, hand hygiene, expiration date checking, skinfold performance, needle angulation, flow verification, dose graduation, site rotation, presence of lipodystrophy, re-utilization of syringes, preservation of needle lubricant, and proper disposal. The sum of correct answers in the checklist is obtained through the evaluation of safe practices in the preparation and administration of insulin by the examinees, with a maximum score of 15 points.

To complement the assessment, episodes of hyper and hypoglycemia were identified, through the records in the glycemic self-monitoring diaries performed by the patients, in the home environment, during the period between the consultations, which occurred at intervals of three to six months.

As this is an observational study and the objective

of identifying a cause-effect relationship was not established, exposure variables or independent variables were not defined. The outcome observed was the improvement in self-care actions related to insulin therapy practices from the first to the second nursing consultation.

Data were collected in a standardized way and by only one evaluator to minimize information bias.

Statistical analysis

The statistical analyses were performed using SPSS version 22. Data normality was verified using the Kolmogorov-Smirnov test. The Students-t test and the McNemar test were applied for the inferential analysis. The data were collected, organized, and tabulated using the Research Electronic Data Capture (REDCap) platform.

Ethical aspects

The Research Ethics Committee of the University Hospital where the study took place approved the study, with opinion No. 2.613.740/2018 and Presentation Certificate for Ethical Assessment No. 83521518.0.0000.5045.

RESULTS

Data from 87 patients with DM were analyzed. The mean age was 57 years (±14), and the mean schooling was eight years (±5). There was a predominance of females with 55 women (63.2%) and 35 (40.2%) participants had a complete vaccination status. Regarding the type of diabetes, 67 (77.0%) had type 2 DM, nine (10.3%) had type 1 DM, four (4.6%) had Maturity Onset Diabetes of the Young (MODY), two (2.3%) had Latent Autoimmune Diabetes in Adults (LADA), and five (5.7%) had post-transplant DM. The mean interval between the first and the second consultation was 4 (±2) months.

The mean time since diagnosis was 14 (±9) years, ranging from one to 47 years. Regarding complications, 44 (50.6%) patients had diabetic retinopathy, 21 (24.7%) had diabetic kidney disease (21, 24.7%), and 42 (49.4%) had diabetic neuropathy. Regarding clinical data, the comorbidities detected were hypertension (74, 85.1%), dyslipidemia (52, 59.8%), hypothyroidism (9, 10.3%), obesity (9, 10.3%), heart disease (16, 8.4%), hypercholesterolemia (3, 3.4%), cataract (3, 3.4%), depression (3, 3.4%), anxiety (3, 3.4%), illness peripheral vascular disease (5, 5.7%), osteoarticular diseases (4, 4.6%) and seven (8%) had no other diseases.

Regarding glycemic control, 36 (41.9%) patients reported episodes of hypoglycemia and 66 (76.7%) of constant hyperglycemia in the Glycemic Self-Monitoring (GSM) utilizing the measurement of capillary blood glucose. A total of 49 (56.3%) patients underwent GSM at home, 75 (90.4%) had a glucometer, and 26 (30.6%) forgot to take their GSM notes to the appointments. The mean blood glucose on the day of the consultations was 221.16 (±103.71), ranging from 72 mg/dL to 536 mg/dL. The mean blood glucose measured by the GSM was 143.52 mg/dL (±79.82). The mean glycated hemoglobin (HbA1c) was 8.45% (±2.76) and ranged from 5.2% to 16.6%.

Regarding the oral antidiabetic drugs used, 69 (90.8%) patients reported using biguanides, 11 (14.5%) used sodium-glucose cotransporter inhibitors 2, nine (11.8%) reported using gliptins or dipeptidyl peptidase-4 inhibitors, and seven (9.2%) reported using sulfonylureas. Regarding other medications, the most prevalent were antihypertensives (61, 87.1%), antilipemic drugs (39, 55.7%), platelet antiaggregants (26, 37.1%), anxiolytics or antidepressants (11, 15.8%), and immunosuppressants (4, 5.7%).

Regarding insulin therapy, all patients used insulin, with an average use of 9.25 years (±9.57), a maximum of 54, and a minimum of one year. Regarding the administration, 76 (87.4%) patients performed self-application, while 11 (12.6%) had the application performed by family members or caregivers. Regarding the type of insulin, 64 (74.4%) used Neutral Protamine Hagedorn (NPH), 56 (65.1%) used regular insulin, 21 (24.4%) the long analogues, and 18 (20.9%) the fast analogues.

Regarding habits, 21 (24.1%) followed dietary guidelines, and 12 (24.1%) said they performed physical exercises. Concerning anthropometry, the mean Body Mass Index (BMI) was 27.74 kg/m² (±4.02), ranging from 18 to 40 kg/m². The mean waist circumference was 90.4 cm (±11.84), with a minimum of 70 cm and a maximum of 129 cm.

During the recorded consultations, the main complaints were polyuria (31, 35.6%), polydipsia (21, 24.1%), polyphagia (20, 23.0%), and weight loss (7, 8.0%), classic symptoms of decompensated DM. There were also reports of pain in the lower limbs (LL) (33, 37.9%), paresthesia in the lower limbs (33, 37.9%), cramps (29, 33.3%), vision change (14, 16 .1%), tiredness (27, 31.0%), weight gain (6, 6.9%), and paresthesia in the upper limbs (UL) (5, 5.7%).

Data analysis showed a significant increase in self-care actions regarding safe practices in insulin therapy in the second consultation compared to the first, with the following results obtained: first consultation: 9.24 (±3.13) versus second consultation: 14.22 (±1.59, p<0.001). The item-by-item evaluation showed a significant increase in correct answers in all self-care practices, except for re-utilizing needles/syringes (Table 1).

DISCUSSION

The analysis of aspects related to insulin therapy in people with DM showed a significant increase in adherence to self-care practices in insulin therapy in the second consultation compared to the first. Self-care is one of the essential aspects in the treatment of diabetes and includes, among other components, the continuous use of prescribed medications, glycemic monitoring, foot care, and periodic consultations and exams[6]. Of the listed components, the present study focused on aspects related to insulin therapy practices and glycemic monitoring.

The nursing consultation occupies an important position concerning adherence to self-care, providing support, guidance, and early identification of adherence problems that affect the correct treatment. This adherence represents clinical improvements and improvements in coping with diabetes and results in a better quality of life[4]. Insulin therapy remains one of the main strategies for managing diabetes. Care ranges from transport to application, proper technique, and correct disposal. Therefore, for the nursing consultation to achieve its purposes, it is necessary to consider the reasons that result in low adherence to adequate insulin therapy practices, which vary from person to person[4].

Inadequacies in insulin therapy practices performed by patients with diabetes can cause social and economic consequences. Personal, economic, educational, and self-perception influence adherence to such practices. The importance of nurses in the health education process to optimize insulin treatment is highlighted. This process should be started immediately after the diagnosis of the disease and sustained systematically, as the adoption of adequate therapeutic measures prevents complications[7]. A cross-sectional study in New Zealand showed that nurses working in diabetes education obtained good glycemic control and diabetes management practices[8].

The sociodemographic and clinical profile found in the present study was similar to that of other investigations[9-10]. The combined use of insulin and other medications was identified. A study in Ger-

Table 1– Analysis of self-care in insulin therapy by patients with diabetes in outpatient nursing care, Fortaleza, CE, Brazil, 2020 (n=87)

Items	Appointment 1 n (%)	Appointment 2 n (%)	P*
Storage in an appropriate place	48 (55.2)	79 (90.8)	<0.001
Correct transport	65 (74.7)	80 (91.9)	0.001
Aspiration of the insulins in a correct order	38 (43.6)	56 (64.3)	<0.001
Hand washing before administering	60 (68.9)	84 (96.5)	<0.001
Knowing the expiry date after opening	29 (33.3)	71 (81.6)	<0.001
Pinching the skin before injection (if needle >8mm)	43 (49.4)	78 (89.6)	<0.001
Checking the flow	9 (10.3)	21 (24.1)	<0.001
Graduating the dose as per the prescription	56 (64.3)	79 (90.8)	<0.001
Using a correct angle for injection	51 (58.6)	82 (94.2)	<0.001
Recognizing the application sites	56 (64.3)	84(96.5)	<0.001
Rotating the application sites	36 (41.3)	68 (78.1)	<0.001
Lipodystrophy	22 (25.3)	10 (11.5)	0.019
Re-utilizing needles/syringes	84 (96.5)	85 (97.7)	<0.655
Preserving needle lubricant	64 (73.56)	84 (96.5)	<0.001
Disposing materials in an appropriate place	42 (48.3)	74 (85.0)	<0.001

* McNemar's t-test;
Source: Prepared by the authors, 2022.

many showed that combined therapies of basal insulin with non-insulin antihyperglycemic drugs could result in complementary effects, including reducing body weight, preventing hypoglycemia, decreasing the necessary insulin dose, and obtaining adequate levels of HbA1c. The choice of combination therapy should be individualized based on patient characteristics and consideration of the advantages and disadvantages of antihyperglycemic agents. Dose adjustments and increased frequency of glucose monitoring may be necessary when co-administering antihyperglycemic agents with basal insulin[11].

The present investigation pointed to a significant improvement in the packaging and transport of insulin from one nursing consultation to the other. It is recommended that unopened vials or insulin cartridges be stored at a temperature of 2ºC to 8ºC since extreme temperatures affect the potency and action of this hormone[1,12].

The order of insulin aspiration was considered one of the main weaknesses found. The association of two types of insulin in the same syringe requires that the fast-acting (regular) insulin be aspirated first and, later, the intermediate-acting insulin (NPH)[1].

There was an increase in hand washing adherence, similar to the findings of another study[9], in which most participants washed their hands before insulin administration. There was also a significant increase in knowledge about insulin expiration date checking. After opening the bottle, insulin should not be used for more than 28 days, with 42 days being the deadline for using insulin detemir[12]. The initial insulin use date should be recorded to monitor the product stability. Sealed insulins are valid for two to three years from the date of manufacture, and the use of outdated insulins is not recommended[1].

The results also showed the inadequacy of the administration technique, a factor that interferes with the variability of glucose levels[11]. It is necessary to perform the subcutaneous fold for insulin injection when the distance between the skin and the muscle is less than or equal to the length of the needle to prevent intramuscular injections and minimize the risk of hypoglycemia[1]. Furthermore, to avoid insulin leakage and ensure that the full dose has been administered, patients should count slowly to 5 or 10 and then withdraw the needle from the skin[11].

There was an improvement in adherence to the practice of observing aspects, including the flow of insulin in the needle, the graduation of the prescribed dose, and the angulation of the needle for administration. These practices support increased patient safety, reduce the risk of errors and adverse events, and increase the precision of the administered dose and glycemic control, minimizing glycemic variability[13].

Regarding the recognition and the rotation of the application sites, there was a significant improvement from the first to the second consultation. Rotation of the injection site is internationally recommended to prevent lipohypertrophy, as this complication affects the distribution of the intended total dose[11]. In this sense, the decrease in cases of lipodystrophy in the present study may be associated with the improvement in the adhesion to the practice of rotating sites and the recognition of the application sites.

The re-utilization of needles and syringes was a common practice, although contraindicated[1]. In the present study, most participants reported that they use the needle more than once, noting that there is a preservation of the needle lubricant, but the practice of re-utilizing this drug is associated with loss of lubrication.

Adherence to safe disposal practices increased from the first to the second nursing consultation. After the injection, the needle and all sharps must be disposed of in an approved biomedical disposal container[12]. Another study[9] identified that a considerable part of the sample did not correctly dispose of syringes and vials, causing contamination of household waste.

The identification of weaknesses and inconsistencies in practices involving insulin therapy can contribute to the establishment of diabetes education strategies, thus preventing possible complications[14-15]. The importance of systematic and continuous diabetes education actions to promote self-care for people with DM is reinforced, aiming to achieve greater effectiveness of insulin treatment.

The findings of this study have implications concerning patient empowerment to perform self-care, control diabetes, and prevent complications related to this chronic condition. The small number of the sample, as a result of the COVID-19 pandemic, during the research period, was a limitation of the study, as well as the use of objective secondary data, which does not capture the subjectivity of some information.

CONCLUSION

Through the findings of the study, a significant improvement in aspects related to insulin the-

rapy and an increase in adherence to self-care practices in diabetes were verified, concerning aspects of storage, transport, order of aspiration, hand hygiene, checking the stability of insulins, pinching the skin before the injection, verification of flow, dose graduation, syringe angulation, recognition and rotation of application sites, reduction of lipodystrophy, preservation of needle lubrication, and proper disposal of materials. The relevance of systematic and continued diabetes education actions is stressed, enabling greater effectiveness of insulin treatment.

CONFLICT OF INTERESTS

The authors have declared that there is no conflict of interests.

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Final approval of the version to be published: Silva DES, Moreira TR, Negreiros FDS, Araújo ST, Silva LMS, Moreira TMM
Responsibility for the text in ensuring the accuracy and completeness of any part of the paper: Silva DES, Moreira TR, Negreiros FDS, Araújo ST, Silva LMS, Moreira TMM