http://www.periodicos.uem.br/ojs/index.php/CiencCuidSaude
ISSN on-line1984-7513
DOI: 10.4025/cienccuidsaude.v19i0.50430

ORIGINAL ARTICLE

SELF-CARE OF PEOPLE WITH MELLITUS DIABETES: REUSE AND DISPOSAL OF SYRINGES AND NEEDLES

Heliny Carneiro Cunha Neves*
Ana Caroliny Faria Alves Favorito**
Valéria Pagotto***
Silvana de Lima Vieira dos Santos****

ABSTRACT

Objective: To analyze the rate of reuse of syringes and needles and identify the practices of disposal of sharps by insulin users. **Method:** Cross-sectional study conducted with people diagnosed with type II diabetes mellitus at a Reference Center for Diagnosis and Therapy in the Midwest region of Brazil. Secondary data from medical records and consultation forms were used. Differences in proportions were estimated by the chi-square test, considering $p < 0.05$. **Results:** The rate of reuse of syringes and needles was 94.9%. There was a high prevalence of reuse of syringes and needles by women, people aged over 60 years, with less than five years of schooling, and more than 11 years of diagnosis. Most users discarded needles and syringes in domestic waste. Thus, self-care practices of people with DM regarding the reuse and disposal of sharps are not safe and may favor complications. **Conclusion:** Althoughdemographic and clinical characteristics had no association with reuse, efforts should be directed towards health education practices, taking into account the person's context, socioeconomic condition, educational level, and active role in the follow-up treatment.

Keywords: Diabetes Mellitus. Insulin. Medical Waste Disposal.

INTRODUCTION

Diabetes mellitus (DM) has become a public health problem, with an exponential increase of prevalence rates, especially in developing countries[1,2]. According to estimates bythe International Diabetes Federation, by the year 2045, 693 million people in the world will have a diagnosis of DM, and Brazil occupies the fourth position in the *ranking* among the countries with the largest number of people affected, which corresponded to approximately 12.5 million in 2017[3].

Glycemic control is one of the treatment goals in this disease and requires care with food, weight control, physical exercise and the use of medications, and in some cases, administration of daily doses of insulin[2,4]. The monitoring of self-care actions is a strategy that should be designed by health care professionals focusing on the unique caracteristics of the people with DM in order to promote their empowerment[5]. Therefore, the assistance provided by health care professionals has an important role in promoting this empowerment in self-care and should prioritize strategies for development of skills and knowledge that affect the self-management ability of the DM patient[6,7].

The treatment of DM with the use of insulin requires that patients have basic knowledge about storage, preparation, administration and disposal of sharps[4]. The importance of proper needle size, the correct process for administering insulin so as to prevent complications and other aspects such as reuse of syringes and needles and disposal of sharps should be addressed by the multiprofessional team to promote the patient's self-care, in the case of those who depend on insulin therapy for treatment[8].

Socioeconomic aspects of the DM patients and the maintenance of the distribution of syringes and needles for insulin-dependent people[8] must also be considered, as these factors have a strong impact on the self-care of these citizens.

According to the Resolution nº 2,605 of the

*PhD Professor, Faculty of Nursing, Federal University of Goiás. Goiânia, GO, Brazil. E-mail: heliny_neves@ufg.br ORCID iD: https://orcid.org/0000-0001-8240-1059
** Graduated from the Faculty of Nursing, Federal University of Goiás. Goiânia, GO, Brazil.E-mail: carolinyalves13@gmail.com ORCID iD: https://orcid.org/0000-0003-2719-3933
***PhD Professor, Faculty of Nursing, Federal University of Goiás. Goiânia, GO, Brazil. E-mail: valeriapagotto@gmail.com ORCID iD: https://orcid.org/0000-0002-5590-2453
****PhD Professor, Faculty of Nursing, Federal University of Goiás. Goiânia, GO, Brazil. E-mail: silvanalvsantos@gmail.com ORCID iD: https://orcid.org/0000-0002-7463-5733

National Health Surveillance Agency[9], disposable syringes and needles are considered single-use health products and their reuse can pose risks and/or cause damages to the health of users[9]. However, the Ministry of Health[10] recommends the reuse of these items up to eight times, contrary to the Brazilian Diabetes Society[2], which does not recommend the reuse at all.

Some studies explain that reuse is not recommended because it can expose the user to infections[2,11], pain and discomfort during applications due to blunted needle tips and consequent lipohypertrophy, infections of the subcutaneous tissue, unexplained cases of hypoglycemia, glycemic variability, or slight increase in HbA1c[2, 8].

Furthermore, improper handling of used needles and other sharp objects can increase the risk of accidental injuries and transmission of blood-borne pathogens[8]. The literature points out that most people with DM do not receive instructions from health professionals about the proper disposal of sharps, and this may lead users to dispose syringes, needles and lancets in household waste[6,12]. Inappropriate disposal of these items represents a social problem, because it creates risks for both the users and theirs families, the community, garbage collectors and the environment[1,13].

With the foregoing in mind, there is a gap between the provision of guidelines[2, 8, 10] and self-care practices of people with DM[14, 15]. In this perspective, the guiding questions of this study was: which are the self-care practices of people with insulin-dependent DM with respect to reuse and disposal of syringes and needles? What is the reuse rate and what factors are associated to reuse?

In this context, evaluating the practice of reuse, disposal of sharps and associated factors may contribute to the structuring of the line of care in chronic non-communicable diseases, including DM, bearing in mind that one of the guidelines is to provide support for self-care and promote the involvement of users as active participants in their treatment[10].

Therefore, the present study aimsto analyze the rate of reuse of syringes and needles andidentify the practices of disposal of sharps by people with insulin-dependent DM.

METHOD

This is an observational, cross-sectional study, developed in an endocrinology outpatient clinic in the secondary care network of a municipality in the state of Goiás, from August 2015 to July 2016. Secondary data from electronic medical records and from nursing consultations of people with type II diabetes mellitus who use insulin therapy, from the endocrinology service of the Reference Center for Diagnosis and Therapy in a capital city of the Midwest region of Brazil were used in the present study.

The study included people of both sexes with type II diabetes mellitus using Neutral Protamine Hagedorn (NPH) or Regular insulin. Patients who used humalog®, novorapid®, apidra®, novolin®, glargina (lantus®), detemir (levemir®) insulin and the insulin pen were excluded because these items are not provided by the municipality.FForms with incomplete information were also excluded.

Data were collected from the forms used by local nurses during the nursing consultation. These forms were created based on the recommendations for evaluation of people with DM of the Ministry of Health (MOH)[10], as well as on the guidelines of the Brazilian Diabetes Society[2]. Each patient seen at this clinic who underwent a nursing consultation had his/her consultation data registered and entered into an electronic medical record. Additional data were retrieved from the medical records, which contained information from other health professionals.This stage of data collection was carried out by scientific initiation fellows, nursing students, who were trained for standardization of the information extracted from the forms and medical records.

In this study, the following variables were analyzed: 1) Demographic characteristics: sex, age, marital status, and years of schooling; 2) Health and clinical conditions: time of diabetes; 3) Insulin therapy practices: self-application, number of applications per day, number of doses per day, volume of insulin administered per day, and needle size; 4) Reuse of needles and syringes (outcome variable); 5) Disposal of material: common waste, specific container, or delivery to a healthcare unit for management of

needles and syringes post-reuse.

To verify the association of the variables with the reuse of needles and syringes, the population was divided into two groups: users who reused needles and syringes up to three times, and users reused them four or more times. Although the MOH[10] recommends the reuse of the same needle and syringe up to eight times and the Brazilian Diabetes Society [2] recommends the single use, the literature usually reports contrasts between reuse of up to three times and four or more times[4,16].

Statistical analyses were performed using the STATA software version 12.0. The data were entered into a database and inconsistencies were checked by two people. A descriptive analysis was made using absolute and relative frequencies, means and standard deviationsdepending on the type of variable (categorical, continuous). Differences between proportions were compared using Pearson's chi-square test considering a $p < 0.05$.

The project was approved by the Research Ethics Committee (REC) under Opinion nº 1,502,305/2016. The data generated from the medical records are confidential and exclusively accessed by the researchers. As this is a study with secondary data, the RECdid not require the application of Informed Consent Forms (ICF) and required a term of commitment for use of data collected from medical records.

RESULTS

Data from 91 medical records of people with insulin-dependent DM were included. In the sample, 57.1% were women, 58.2% were in the age group between 35 and 59 years (mean of 56.6 years), 59.3% were married, and 51.9% had between 6 and 10 years of schooling (Table 1).

The rate of at least once reuse of syringes and needles was 94.9%. The prevalence of ≥ 4 times of reuse was 48.3%. In the group that reused them four or more times, the range of use varied from four to 60 times.

People of female sex, aged 60 and over, widowed, and with schooling > 11 years had a higher, although not statistically significant, proportion of reuse (Table 1).

Greater proportion of reuse was found among people making four to six applications a day (55.2%), using an insulin volume ≥ 101 IU per day (81.8%), and using a needle ≤ 8 mm (72.7%). The volume of insulin administered per day was associated with a greater amount ofreuse of needles and syringes (Table 2). The care measures with needles and syringes after reuse and disposal of sharps are shown in Figure 1.

Table 1. Characterization of people with insulin-dependent Diabetes Mellitus regarding the reuse of syringes and needles in relation to sociodemographic characteristics. Goiânia, Goiás, Brazil.

Sociodemographic variables	**Total**	**Reuse n (%)**		p value
	n (%)	**≤ 3 times**	**≥ 4 times**	
Sex				0.102
Female	52 (57.1)	23 (44.2)	29 (55.8)	
Male	39 (42.9)	24 (61.5)	15 (38.2)	
Age group				0.489
35-59 years	53 (58.2)	29 (54.7)	24 (45.3)	
≥ 60 years	38 (41.8)	18 (47.4)	20 (52.6)	
Marital status				0.195
Single	23 (25.3)	13 (56.5)	10 (43.5)	
Married	54 (59.3)	30 (55.6)	24 (44.4)	
Widowed	14 (15.4)	4 (28.6)	10 (71.4)	
Years of schooling				0.869
0-5 years	21 (27.3)	12 (57.1)	9 (42.9)	
6-10 years	40 (51.9)	23 (57.5)	17 (42.5)	
≥ 11 years	16 (20.8)	8 (50.0)	8 (50.0)	

Table 2. Characterization of people with insulin-dependent Diabetes Mellitus regarding the conditions of insulin application and the reuse of needles and syringes. Goiânia, Goiás, Brazil.

Variables	Total n (%)	Reuse n (%)		p value
		≤ 3 times	≥ 4 times	
Time with the disease				0.657
0-10 years	35 (43.2)	20 (57.1)	15 (42.9)	
≥ 11 years	46 (56.8)	24 (52.2)	22 (47.8)	
Self-application				0.549
Yes	69 (80.2)	35 (50.7)	34 (49.3)	
No	17 (19.8)	10 (58.8)	7 (41.2)	
Number of applications/day				0.373
01/mar	62 (68.1)	34 (54.8)	28 (45.2)	
04/jun	29 (31.9)	13 (44.8)	16 (55.2)	
Insulin volume administered/day (IU)				0.038
jan/50	37 (40.7)	23 (62.2)	14 (37.8)	
51-100	43 (47.2)	22 (51.2)	21 (48.8)	
≥ 101	11 (12.1)	2 (18.2)	9 (81.8)	
Needle size				0.098
≤ 8	11 (17.5)	3 (27.3)	8 (72.7)	
> 8	52 (82.5)	30 (57.7)	22 (42.3)	

The care measures with needles and syringes after reuse and disposal of sharps are shown in Figure 1.

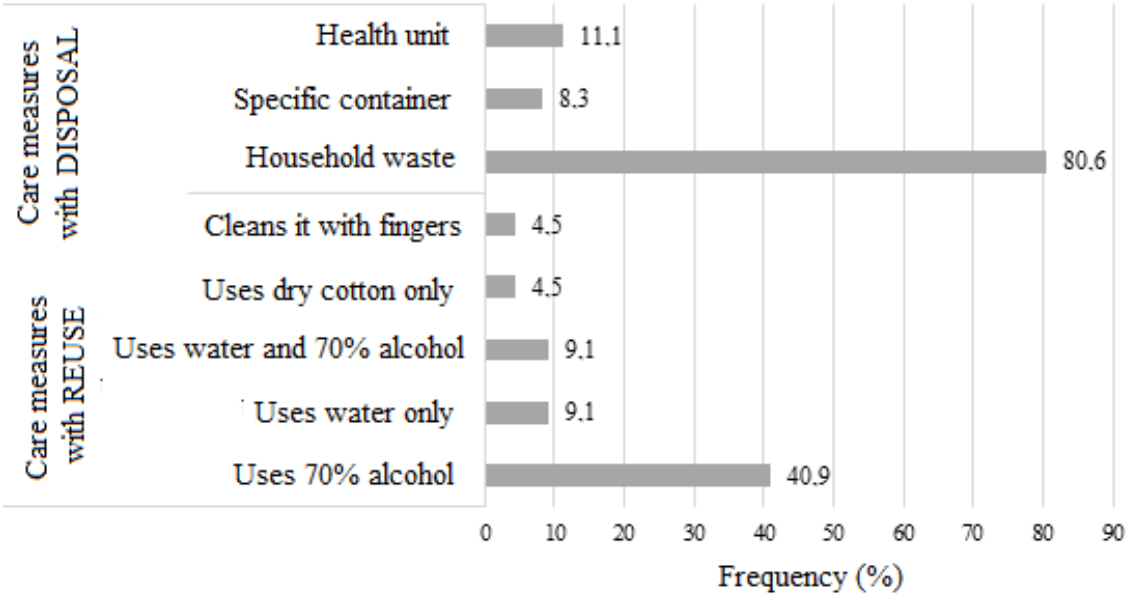

Figure 1. Care measures with the reuse and disposal of syringes and needles adopted by insulin users. Goiânia, Goiás, Brazil.

The results of this study show that the self-care practices adopted by people with DM regarding the reuse and disposal of sharps are not safe and may favor complications, and especially the uncontrolled glycemic levels in DM.

DISCUSSION

In this study, there was a high rate of reuse of syringes and needles and a high proportion of inadequate care in the handling of these supplies. Due to this high rate of reuse, it was not possible to identify differences in proportions between the groups analyzed. That is, the practice of reuse is frequent in the population with DM, and this reinforces the need to strengthen the line of care within the context of the Unified Health System,

especially with regard to provision and management of supplies for insulin therapy.

Self-care for people with insulin-dependent DM is closely related to the use of insulin, as these patients have difficulties in controlling their disease with non-pharmacological measures[17]. Although insulin treatment is widespread, most users have poor knowledge and information about it, leading to unsafe insulin therapy practices[18], including inappropriate reuse of syringes and needles and disposal. Health promotion actions that enable self-management and self-care among people with DM are essential[18], especially in relation to the practice of reusing syringes and needles, in order to prevent complications and promote glycemic control and adherence to treatment[17].

Low levels of education can also have an influence on self-care and be a limiting factor, because people with little education may have difficulty understanding the information and guidance provided[19]. Thus, access to preventive and therapeutic measures in health is lower, which is, therefore, a relevant indicator for planning health actions aimed at patient involvement and self-management of treatment[6,16]. A study conducted with patients with DM, users of insulin, registered in the Family Health Strategy units of the municipality of Formiga, MG, found that 63% had not completed high school and 40% reused the syringe more than ten times[12]. These data is in line with our findings, since 48.3% reused the syringe in a range from 4 to 60 times.

People with DM need to incorporate changes in their lifestyle and have the ability to identify and solve the needs arising from their disease; thus, models of treatment and health interventions that promote self-care are necessary[5], especially for elderly patients and those with low levels of education.

The strengthening of the health care policy forolder people with DM, regarding this theme, is important, since knowledge about the disease and the practice of insulin therapy interfere with adherence to treatment and improvement of clinical results[20].

As part of a multidisciplinary team, nurses have a crucial role in organizing health care and conducting educational processes to promote the engagement of people with DM in order to encourage the incorporation of safe practices regarding storage, preparation and administration of insulin.

The application of the nursing process during the consultation can be a strategy to be used to know the reality and the context of life of the person with insulin-dependent DM[20]. Through active listening, it is possible to identify the facilitating and hindering factors for adherence to treatment, the technique of safe application of insulin, and care measures with reuse of syringes and needles and proper disposal of sharps, since the guidelines for reuse[2,8,10] are not standardized and lack scientific evidence.

Although we did not find an association between the time of diagnosis of the disease and the increased reuse of syringes and needles in this study, it was observed that the rate of reuse was higher in insulin-dependent DM patients diagnosed more than 11 years ago. Therefore, it is necessary to explore this population based on the hypothesis of trivialization of the reuse in the management of the disease.

The frequency of needle and syringe reuse evidenced in this study corroborates the data in the literature, which show that reuse ranges from 2 to 21 times[20]. A study carried out in 18 centers specialized in diabetes in Bangladesh identified a high rate of reuse of needles (98.5%), amongwhich those measuring 8 mm in length were the most reused (40.5%)[11].

The Ministry of Health predicts that the reuse of needles by an individual can happen eight times, provided some criteria to prevent injuries and infections related to reuse be observed, such as using good hygiene methods and maintaining the protective cover, thus ensuring non-contamination[10]. According to the American Diabetes Association (ADA), if the needle and syringe are to be reused, the instruction of a trained professional must be followed[21].

The Brazilian Diabetes Society[2], on the other hand, does not encourage the practice of reuse. The reason is that the society assumes that not all people affected by the disease will follow the guidelines correctly, so that this practice may generate more expenses for the government in case of complications resulting

from inadequate reuse and possible waste of insulin, interfering in the effectiveness of the treatment.

Reuse negatively influences treatment adherence because applications become more painful with reused needles[20]. Other complications such as bruising and hardening of the region are also associated with reuse[7]. In this sense, the aforementioned study carried out in centers in Bangladesh[11] found that longer needles and a higher frequency of reuse were associated with increased pain and bleeding among patients with insulin-dependent DM.

As needles and syringes are defined as single-use health products[9], sterile conditions are not guaranteed they are reused, and the possibility of lossof their characteristics should be considered in this situation[22]. Furthermore, reuse favors the loss of adjustment between barrel, plunger and sealing ring and this can alter the dosage of insulin due to the fact that the plunger does not slide properly[20].

In this study, it was observed that the greater the volume of insulin administered per day, the greater the amount of reuse of syringes and needles by insulin-dependent patients. The literature also shows that the greater the reuse, the greater the probability that the volume of insulin administered is inadequate, not collaborating,therefore, with treatment[22]. Thus, it is necessary that health professionals pay attention to the therapeutic regimen of people with DM who have a higher volume of insulin to administer each day and incorporate guidelines on the adoption of safe practices for insulin administration at home, especially on the reuse of syringes and needles.

Regarding the disposal of syringes and needles, the participants in this study treated this type of health waste as household waste. Some people used polyethylene terephthalate (PET) bottles for temporary storage of sharps and then, when the container is filled, they dispose it together with common waste. These practices make users and the community vulnerable and do not comply with the recommendations of the MOH[10], which advise that, when there is no appropriate container available for disposal in the health unit, the person should at least allocate sharps in sturdy rigid containers. When full, they must be sent to the health unit for proper management[10].

Health residues generated by insulin-dependent people make up the group E of RDC nº 222/2018 (23), which provides for disposal of sharps. Disposal of this type of waste must be made inside identified, rigid containers with lids, resistant to puncture, rupture and leakage.

This pattern of inappropriate disposal of sharps was also identified in a study carried out in northeastern Malaysia, which found that 88.6% of people with DM disposed sharps in plastic bags and 35.9% did not remember to be advised by health professionals about the use and disposal of syringes and needles[24].

Guidance about disposal by health professionals, especially nurses, was associated with the correct disposal of this waste[24]. These findings reinforce that, in primary health care, nurses have a fundamental role in advising on the disease, especially regarding the correct disposal of inputs used by people with insulin-dependent DM[5]. Knowledge allows these patients to self-manage their behavior, in addition to being associated with safe practices regarding the disposal of sharps[24].

Regarding the hygiene care measures adopted by users when reusing needles and syringes, most used 70% alcohol. This conduct was also shown in another study, in which 43.4% of users cleaned the needle with alcohol and recapped it with the protector[24]. Still, other evidence source identified a prevalence of this practice of 61.54%[20].

The MOH[25] advises that needles should not be cleaned with alcohol, as this substance can remove the silicone that covers it and, consequently, cause adverse events, such as pain and bruising. In this perspective, the strategy of educational groups can facilitate the development of new knowledge and practices that lead to the strengthening of the bond between the health team and clients, so as to make them feel embraced and co-responsible to adhere and perform treatment appropriately[6,12].

Thus, the best approach should be sought to guide and effectively prepare persons with DM, so that they can be the protagonists of their treatment and their health. The study has some limitations, due to the sample size and the secondary data retrieved from medical records,

which lead to a great amount of missing data.

CONCLUSIONS

The results obtained in this study made it possible to identify a high prevalence of reuse of syringes and needles for insulin therapy by people the female sex, over 60 years of age, less than five years of schooling, with more than 11 years of diagnosis, and who made three applications per day and more than four doses, with a volume of 51-100 IU per day, with needles greater than 8 mm. As for the hygiene techniques adopted after reuse, use of alcohol and incorrect disposal of sharps in household waste prevailed.

Data reveal that efforts should be directed towards health education practices for users of insulin at home, considering their context, socioeconomic status, level of education and their active role in following up the treatment. The adoption of inappropriate practices regarding reuse puts users at risk, in addition to causing low adherence to treatment due to complications such as pain, bruising and infections.

The investigation of reuse and disposal practices adopted by people with insulin-dependent DM can support health guidelines and actions, as well as the definition of priority lines of care for these patients. Although the reuse of syringes and needles is permitted, this study provides evidence that this practice should be rethought, as it can influence the dosage of insulin and contribute to the ineffectiveness of the treatment. Studies should be carried out in this perspective to change this practice.

We consider extremely important to investigate the influence of health education on safe self-care practices in the use of needles and syringes and on correct disposal of sharps by people with insulin-dependent DM.

AUTOCUIDADO DE PESSOAS COM DIABETES MELLITUS: REUSO E DESCARTE DE SERINGAS E AGULHAS

ABSTRACT

Objetivo: Analisar a taxa de reuso de seringas e agulhas e identificar as práticas de descarte de perfurocortantes por usuários de insulina. **Método:** Estudo transversal, realizado com pessoas diagnosticadas com diabetes mellitus tipo II de um Centro de Referência em Diagnóstico e Terapêutica da região Centro-Oeste do Brasil. Foram utilizados dados secundários provenientes de prontuários e fichas de consulta. As diferenças de proporção foram estimadas pelo teste qui-quadrado, considerando-se p<0,05. **Resultados:** A taxa de reuso de seringas e agulhas foi de 94,9%. Houve alta prevalência do reuso de seringas e agulhas por mulheres, com mais de 60 anos, com tempo de estudo menor do que cinco anos, que possuíam mais de 11 anos de diagnóstico. A maioria dos usuários descartou as agulhas e seringas no lixo domiciliar. Tais dados evidenciam que as práticas de autocuidado realizadas pelas pessoas com DM quanto ao reuso e descarte de perfurocortantes não são seguras e podem favorecer complicações. **Conclusão:** Apesardas características demográficas e clínicas não terem apresentado associação com o reuso, esforços devem ser direcionados para as práticas de educação em saúde, levando em consideração o contexto da pessoa, a condição socioeconômica, nível de escolaridade e seu papel ativo no seguimento do tratamento.

Palavras-chave: Diabetes Mellitus. Insulina. Eliminação de Resíduos de Serviços de Saúde.

AUTOCUIDADO DE PERSONAS CON DIABETES MELLITUS: REUTILIZACIÓNY DESECHO DE JERINGAS Y AGUJAS

RESUMEN

Objetivo: analizar la taza de reutilización de jeringas y agujas e identificar las prácticas de desecho de punzocortantes por usuarios de insulina. **Método:** estudio transversal, realizado con personas diagnosticadas con diabetes mellitus tipo II de un Centro de Referencia en Diagnóstico y Terapéutica de la región Centro-Oeste de Brasil. Fueron utilizados datos secundarios provenientes de registros médicos y fichas de consulta. Las diferencias de proporción fueron analizadas por la prueba de chi-cuadrado, considerándose p<0,05. **Resultados:** la taza de reutilización de jeringas y agujas fue de 94,9%. Hubo alta prevalencia de la reutilización de jeringas y agujas por mujeres, con más de 60 años, con tiempo de estudio menor que cinco años, que poseían más de 11 años de diagnóstico. La mayoría de los usuarios descartólas agujas yjeringas en labasura domiciliaria. Tales datos evidencian que las prácticas de autocuidado realizadas por las personas con DM respecto a la reutilización y desecho de punzocortantes no son seguras y pueden favorecer complicaciones. **Conclusión:** Aunque las características demográficas y clínicas no hayan presentado asociación con la reutilización, esfuerzos deben ser dirigidos para las prácticas de educación en salud, teniendo en cuentael contexto de la persona, la condición socioeconómica, el nivel de escolaridad y su rol activo en el sector del tratamiento.

Palabras clave: Diabetes Mellitus. Insulina. Eliminación de desechos sanitarios.

REFERENCES

1. World Health Organization. Global report on diabetes. WHO Library Cataloguing in Publication Data. World Health Organisation [Internet]. 2016 [acesso em 12 jul 2020]. Available from: http://apps.who.int/iris/bitstream/10665/204871/1/9789241565257_eng.pdf.

2. Oliveira JEP, Júnior RMM, Vencio S, organizadores. Diretrizes da Sociedade Brasileira de Diabetes 2017-2018. São Paulo (SP): Editora Clannad; 2017. Available from: https://www.diabetes.org.br/profissionais/images/2017/diretrizes/diretrizes-sbd-2017-2018.pdf

3. International Diabetes Federation. Diabetes Atlas Eighth Edition [Internet]. 2017 [acesso em 12 jul 2020]. Available from: https://www.idf.org/e-library/epidemiology-research/diabetes-atlas.html

4. Silva ENSF, Santana PS, Palmeira CS. Descarte de seringas e agulhas por pacientes com diabetes mellitus. Revista Enfermagem Contemporânea. 2013; 2(1):82-102. Doi: http://dx.doi.org/10.17267/2317-3378rec.v2i1.200

5. Xavier SM, Fernandes MNB, Silva PH, Arruda LP, Júnior EBS. Estratégias para promoção da segurança dos usuários diabéticos na Estratégia Saúde da Família. Cienc Cuid Saude. 2020; 19:e50319. Doi: http://dx.doi.org/10.4025/cienccuidsaude.v19i0.50319

6. Pereira FGF, Diógenes MAR, Ataíde MBC, Mendonça Júnior JO, Leal DE, Xavier ATF. Fatores Relacionados à utilização de insulina em diabéticos acompanhados pela estratégia saúde da família. Rev. APS. 2016; 19(1):58-66. Available from: https://periodicos.ufjf.br/index.php/aps/article/view/15532

7. Pinchera B, Dellolacono D, Lawless CA. Best practices for patient self-management: implications for nurse educators, patient educators, and program developers. J Contin Educ Nurs. 2018; 49(9):432- 40. Doi: http://dx.doi.org/10.3928/00220124-20180813-09

8. Silver B, Ramaiya K, Andrew BS, Fredrick O, Sarita B, Sanjay K, et al. EADSG Guidelines: insulin storage and optimisation of injection technique in diabetes management. Diabetes Therapy. 2019; 10:341–366. Doi: https://doi.org/10.1007/s13300-019-0574-x

9. Agência Nacional De Vigilância Sanitária. Resolução – RE n. 515, 15 de fevereiro de 2006. Lista de produtos médico-hospitalares de uso único. Brasília: Anvisa. [Internet]. 2006 [acesso em 12 jul 2020]. Available from: http://adcon.rn.gov.br/ACERVO/Suvisa/doc/DOC000000000025053.PDF

10. Ministério Da Saúde, Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Estratégias para o cuidado da pessoa com doença crônica: diabetes mellitus (Cadernos de Atenção Básica, n. 36) / Ministério da Saúde, Secretaria de Atenção à Saúde, Departamento de Atenção Básica. Brasília: Ministério da Saúde. [Internet]. 2013. [acesso em 12 jul 2020]. Available from: https://bvsms.saude.gov.br/bvs/publicacoes/estrategias_cuidado_pessoa_diabetes_mellitus_cab36.pdf

11. Kamrul-Hasan ABM, Paul AK, Amin MN, Gaffar AJ, Asaduzzaman MD, Saifuddin M, et al. Insulin Injection Practice and Injection Complications – Results from the Bangladesh Insulin Injection Technique Survey. European Endocrinology. 2020; 16(1):41–8. Doi: https://doi.org/10.17925/EE.2020.16.1.41

12. Junior JB, Couto VCC, Vítor KA, Oliveira MG, Pinheiro PLL, Rossi VEC. Insulinoterapia em domicílio: práticas adotadas por uma população de diabéticos no município de Formiga – MG. Revista Conexão Ciência. 2016; 11(2):59-63. Doi: https://doi.org/10.24862/cco.v11i2.452

13. World Health Organization. Safe management of wastes from healthcare activities. 2 ed. Editadopor: Chartier Y, Emmanuel J, Pieper U, Pruss A, Rushbrook P, Stringer R et al. 2014. Available from: http://www.who.int/water_sanitation_health/medicalwaste/wastemanag/en/

14. Olamoyegun MA, Akinlade AT, Ala OA. Audit of insulin prescription patterns and associated burden among diabetics in a tertiary health institution in Nigeria. Afr Health Sci. 2018; 18(4):852–64. Doi: http://dx.doi.org/10.4314/ahs.v18i4.3

15. Spollett G, Edelman SV, Mehner P, Walter C, Penfornis A. Improvement of insulin injection technique: examination of current issues and recommendations. Diabetes Educ. 2016; 42(4):379–94. Doi: https://doi.org/10.1177/0145721716648017

16. Cunha GH, Barbosa RVA, Fontenele MSM, Lima MAC, Franco KB, Fechine FV. Resíduos de insulinoterapia produzidos no domicílio de diabéticos acompanhados na Atenção Primária. Rev Bras Enferm.2017; 70(3):618-25. Doi: http://dx.doi.org/10.1590/0034-7167-2016-0406

17. Almeida DA, Santos MS, Rosa WAG, Zeferino MGM, Oliveira ISB, Lenza NFB. Conhecimento dos cuidadores informais de idosos com Diabetes Mellitus tipo 2 em insulinoterapia na atenção primária à saúde. Saúde (Sta.Maria). 2018; 44(2):1-13. Doi: http://dx.doi.org/10.5902/2236583431014

18. Reis P, Marcon SS, Nass EMA, Arruda GO, Back IR, Lino IGT, et al. Performance of people with diabetes mellitus under insulin therapy. Cogitare enferm. 2020; 25:e66006. Doi: http://dx.doi.org/10.5380/ce.v25i0.66006

19. Arrelias CC, Faria HT, Teixeira CR, Santos MA, Zanetti ML. Adherence to diabetes mellitus treatment and sociodemographic, clinical and metabolic control variables. Acta Paul Enferm. 2015; 28(4):315-22. Doi: http://dx.doi.org/10.1590/1982- 0194201500054

20. Colet C, Dalpiaz J, Petri AA, Schneider A, Schiavo M, Spanevello S, et al. Cuidados na aplicação de insulina por diabéticos em unidade básica de saúde do RS. Revista Contexto & Saúde. 2014; 12(23):81-4. Doi: https://doi.org/10.21527/2176-7114.2012.23.81-84

21. American Diabetes Association. Insulin administration. Diabetes Care [Internet]. 2004 [acesso em 12 jul 2020]. Available from: http://www.diabetes.org/newsroom/press-releases/2007/research-budget-2007.html

22. Stacciarini TSG, Haas VJ, Pace AE. Técnica de autoaplicação de insulina com seringas descartáveis entre os usuários com diabetes mellitus, acompanhados pela Estratégia Saúde da Família. Rev. Latino-Am. Enfermagem. 2009; 17(4):474-480. Doi: http://dx.doi.org/10.1590/S0104-11692009000400007

23. Agência Nacional De Vigilância Sanitária. Resolução RDC n° 222 de 28 de março de 2018, que regulamenta as boas práticas de gerenciamento dos resíduos de serviços de saúde e dá outras providências. DOU nº 61 de 29 de março de 2018, Brasília. [Internet]. 2018 [acesso em 12 jul 2020]. Available from: http://portal.anvisa.gov.br/documents/10181/3427425/RDC_222_2018_.pdf/c5d3081d-b331-4626-8448-c9aa426ec410

24. Hasan UA, Hairon SM, Yaacob NM, Daud A, Hamid AA, Hassan N, et al. Factors Contributing to Sharp Waste Disposal at Health Care Facility Among Diabetic Patients in North-East Peninsular Malaysia. Int J Environ Res Public Health. 2019;16(13)2251. Doi: http://dx.doi.org/10.3390/ijerph16132251

25. Ministério da Saúde. Departamento de Atenção Básica. Hipertensão arterial sistêmica e diabetes mellitus: protocolo.

Área técnica de diabetes e hipertensão arterial. Brasília. [Internet]. 2001 [acesso em 12 jul 2020]. Available from: http://bvsms.saude.gov.br/bvs/publicacoes/cd05_06.pdf.

Corresponding author: Heliny Carneiro Cunha Neves. Rua 227, Qd 68, S/N - Setor Leste Universitário - Goiânia - Goiás - Brasil - CEP: 74605-080 Telefone: (62) 3209-6280. Ramal: 221. E-mail: heliny_neves@ufg.br

Submitted: 15/10/2019
Accepted: 01/09/2020