

ORIGINAL ARTICLE

HEALTH CARE FOR PATIENTS WITH TYPE 2 DIABETES MELLITUS
CUIDADOS EM SAÚDE AOS PACIENTES PORTADORES DE DIABETES MELLITUS TIPO 2
ATENCIÓN DE SALUD PARA PACIENTES CON DIABETES MELLITUS TIPO 2

Jamilly Hellen Ribeiro da Costa¹ Samia Regina Tavares da Silva² Simony Cazuza Duarte³ Samila Torquato Araújo⁴ Cristefânia Meirú de Lima⁵ Eysler Gonçalves Maia Brasil⁶

ABSTRACT

Objectives: to identify and to analyze the main health care actions for patients with type 2 Diabetes Mellitus and to study how patients perform self-care. **Method:** a bibliographic, descriptive, and integrative review study was performed. The searched databases were MEDLINE, LILACS, Scopus, BDENF, and the SciELO virtual library, with a time frame from 2013 to 2018. The descriptors "Type 2 Diabetes Mellitus", "Nursing Care" and "Self-care" were crossed, totaling 788 studies that were evaluated following a careful evaluation method. The final sample consisted of 17 articles. **Results:** the following three categories were evidenced within the studies: Use, administration, and storage of medications; Glycemic control and foot self-care; and Diet, physical activity, body weight, and family support. **Conclusion:** nurses should develop educational activities and be aware of their educational role to help patients understand the need for treatment and the importance of treatment adherence.

Descriptors: Diabetes Mellitus, Type 2; Self Care; Nursing Care; Nursing; Patients; Health.

RESUMO

Objetivos: identificar e analisar os principais cuidados em saúde aos portadores de Diabetes Mellitus Tipo 2 e estudar como os pacientes realizam o autocuidado. **Método:** estudo bibliográfico, descritivo, tipo revisão integrativa. Realizou-se a busca por artigos nas bases de dados MEDLINE, LILACS, Scopus e BDENF e na Biblioteca Virtual SciELO, recorte temporal de 2013 a 2018. Fez-se o cruzamento entre os descritores "Diabetes Mellitus Tipo 2", "Cuidados de Enfermagem" e "Autocuidado", totalizando 788 estudos encontrados, seguindo-se avaliação criteriosa do conteúdo, o que resultou em amostra final composta por 17 artigos. **Resultados:** evidenciaram-se três categorias dentro dos estudos: Cuidados com uso, administração e armazenamento das medicações; Controle glicêmico e autocuidado dos pacientes/cuidados com os pés; e Cuidados com alimentação, prática de atividades físicas, peso corporal e apoio familiar. **Conclusão:** enfermeiros devem desenvolver atividades educativas, conscientes do papel de educador que devem desempenhar, para que o paciente compreenda a necessidade do tratamento e participe desta adesão.

Descritores: Diabetes Mellitus Tipo 2; Autocuidado; Cuidados de Enfermagem; Enfermagem; Pacientes; Saúde.

RESUMEN

Objetivos: identificar y analizar las principales acciones asistenciales para pacientes con Diabetes Mellitus tipo 2 y estudiar cómo los pacientes realizan el autocuidado. **Método:** se realizó un estudio de revisión bibliográfica, descriptiva e integradora. Las bases de datos buscadas fueron MEDLINE, LILACS, Scopus, BDNF y la biblioteca virtual SciELO, con un marco temporal de 2013 a 2018. Se cruzaron los descriptores "Diabetes Mellitus tipo 2", "Atención de enfermería" y "Autocuidado", totalizando 788 estudios que fueron evaluados siguiendo un método de evaluación cuidadoso. La muestra final estuvo compuesta por 17 artículos. **Resultados:** dentro de los estudios se evidenciaron las siguientes tres categorías: Uso, administración y almacenamiento de medicamentos; Control glucémico y autocuidado de los pies; y Dieta, actividad física, peso corporal y apoyo familiar. **Conclusión:** el enfermero debe desarrollar actividades educativas y ser consciente de su rol educativo para ayudar a los pacientes a comprender la necesidad de tratamiento y la importancia de la adherencia.

Descriptores: Diabetes Mellitus Tipo 2; Autocuidado; Atención de Enfermería; Enfermería; Pacientes; Salud.

^{1,2,3,4}Estácio do Ceará University. Fortaleza (CE), Brasil. ¹<https://orcid.org/0000-0002-3833-591X>

²<https://orcid.org/0000-0002-7773-5123> ³<https://orcid.org/0000-0003-2677-498X>

⁴<https://orcid.org/0000-0002-2089-377X>

^{5,6}University for International Integration of the Afro-Brazilian Lusophony/UNILAB. Redenção (CE), Brazil. ⁵<https://orcid.org/0000-0001-8919-4988> ⁶<https://orcid.org/0000-0002-4126-2256>

*Article extracted from the Undergraduate Thesis << Health care for patients with Type 2 Diabetes Mellitus: an integrative review >>. Estacio do Ceará University, 2018.

How to cite this article

Costa JHR, Silva SRT, Duarte SC, Araújo ST, Lima CM, Brazil EGM. Health care for patients with Type 2 Diabetes Mellitus. J Nurs UFPE on line. 2021;15:e244995 DOI: <https://doi.org/10.5205/1981-8963.2021.244995>

INTRODUCTION

Diabetes Mellitus (DM) is an important and growing health problem for all countries, regardless of their development status.¹ Evidence has been found that individuals with poorly managed or untreated DM develop more complications than those who have a good disease management. Despite this, in some circumstances, it is pointed out that the complications of DM are found even before hyperglycemia, showing the great heterogeneity of this metabolic disorder. It should also be noted that there is no consensus on the extent to which chronic DM complications result from hyperglycemia or associated conditions such as insulin deficiency, excessive glucagon, changes in osmolarity, protein glycation, and lipid or blood pressure changes.¹

The link between patients and professionals responsible for their care must be established right after the diagnosis, ensuring access and provision of care in the health care network. The repercussions of a chronic disease and its unpredictable course impose the continuity of care in health services and the implementation of multidisciplinary actions, which requires competence, professional ability, and results.²

In 2017, the International Diabetes Federation (IDF) estimated that 8.8% (95% confidence interval [CI]: 7.2 to 11.3) of the world population aged 20 to 79 years old (424.9 million people) were living with DM. It is estimated that the number of people with DM will be superior to 628.6 million in 2045. It should be noted that about 79% of cases are in developing countries in which the greatest increase in DM cases should occur in the coming decades.¹

The current DM classification is based on etiology and not on the type of treatment. Therefore, the terms "insulin-dependent DM" and "insulin-independent DM" should no longer be used. It is noted that the classification proposed by the American Diabetes Association (ADA) includes four clinical classes: Type 1 Diabetes Mellitus (T1DM1), subdivided we types 1A and 1B; Type 2 Diabetes Mellitus (T2DM); other specific types of DM; and Gestational Diabetes Mellitus (GDM).³

The most common symptoms of DM are polyuria, polydipsia, polyphagia, and involuntary weight loss. In more severe cases, metabolic acidosis, ketoacidosis, and dehydration are manifested. Concerning T2DM, the patient may be asymptomatic. The diagnostic suspicion may occur late due to complications such as proteinuria related to nephropathy, and macrovascular and/or microvascular complications such as cardiovascular disease, retinopathy, and peripheral neuropathy. Besides, the persistence of infections and peripheral vascular involvement may progress to limb amputation.⁴

The relevance of nurses being open to listening patients and communicating in an accessible way with the patients' families is highlighted. When nurses are interested in knowing and understanding the patients' experiences, difficulties, conflicts, unions, relationships, and interactions, they can

interact with the family as a care unit, addressing it in its multi dimensionalities. The act of involving families and existing relationships in the care process strengthen bonds, produce and maintain communication channels, and promote care.⁵

Thus, the following study questions emerged: what are the main health care actions for patients with T2DM? How do patients perform self-care? Once the care for these patients is known and guaranteed, they must understand what the day-to-day care and the Nursing guidelines consists of.

This study is justified due to the growing number of complications related to diabetes. Such problems could and should be avoided with guidance by multidisciplinary teams working at primary care facilities and, more specifically, through nursing actions. It is argued that professional nurses must develop competencies and skills that allow identifying and accessing health care related information to support their attitudes, ensuring integration and assistance throughout the health care network.

The current study is considered relevant since it shows, clearly and succinctly, health care actions in the context described above. Therefore, this study may contribute to the health care of patients with diabetes so that doubts are clarified and so that they come to understand the importance of each care action performed, preventing future complications.

OBJECTIVES

To identify and to analyze the main health care actions for patients with type 2 Diabetes Mellitus and to study how patients perform self-care.

METHOD

This is a bibliographic, descriptive, integrative review study, composed of six stages: 1. Identification of the theme and guiding question; 2. Inclusion/exclusion criteria and sampling; 3. Categorization of studies; 4. Evaluation of studies; 5. Interpretation of results; and 6. Presentation of the review.⁶

1st Phase: Identification of the theme and guiding question

Evidence-Based Practice (EBP) is a problem-solving approach to decision-making that incorporates the search for the best and most recent evidence, professional clinical competence, values, and patient preferences in regard to the care actions provided.⁶ The following questions were used to guide this literature review: what are the main health care actions for patients with T2DM? How do patients perform self-care?

2nd Phase: Inclusion/Exclusion Criteria and Sampling

Articles were searched in the following databases to obtain answers to the proposed research questions: Latin American and Caribbean Health Sciences Literature (LILACS), Medical Literature Analysis and Retrieval System Online (MEDLINE), Brazilian Nursing Database (BDENF in Portuguese), Scopus, and Scientific Electronic Library Online (SciELO), in April and May 2018. We used the following descriptors from the Health Sciences Descriptors (DeCS in Portuguese), which belong to the Virtual Health Library (BVS in Portuguese) portal: "Type 2 Diabetes Mellitus", "Nursing Care," and "Self-care". These descriptors were crossed using the Boolean operator AND. The following inclusion criteria were established: articles addressing the study's theme, with full text available in the databases mentioned above, written in Portuguese or English, and published as original articles. Dissertations, theses, and articles published outside the time frame of 2013 to 2018 were excluded.

The sample was selected based on the inclusion and exclusion criteria and considered the articles that best suited the research objectives and guiding questions. During the search process, 788 studies were found of which 401 were fully available, 358 were written in Portuguese or English, 293 were original articles whose abstracts were read and, among these, 17 fit the theme and answered the guiding questions. Figure 1 depicts the Preferred Reporting Items for Systematic Reviews and Meta-Analyzes (PRISMA) flow diagram of the search.⁷

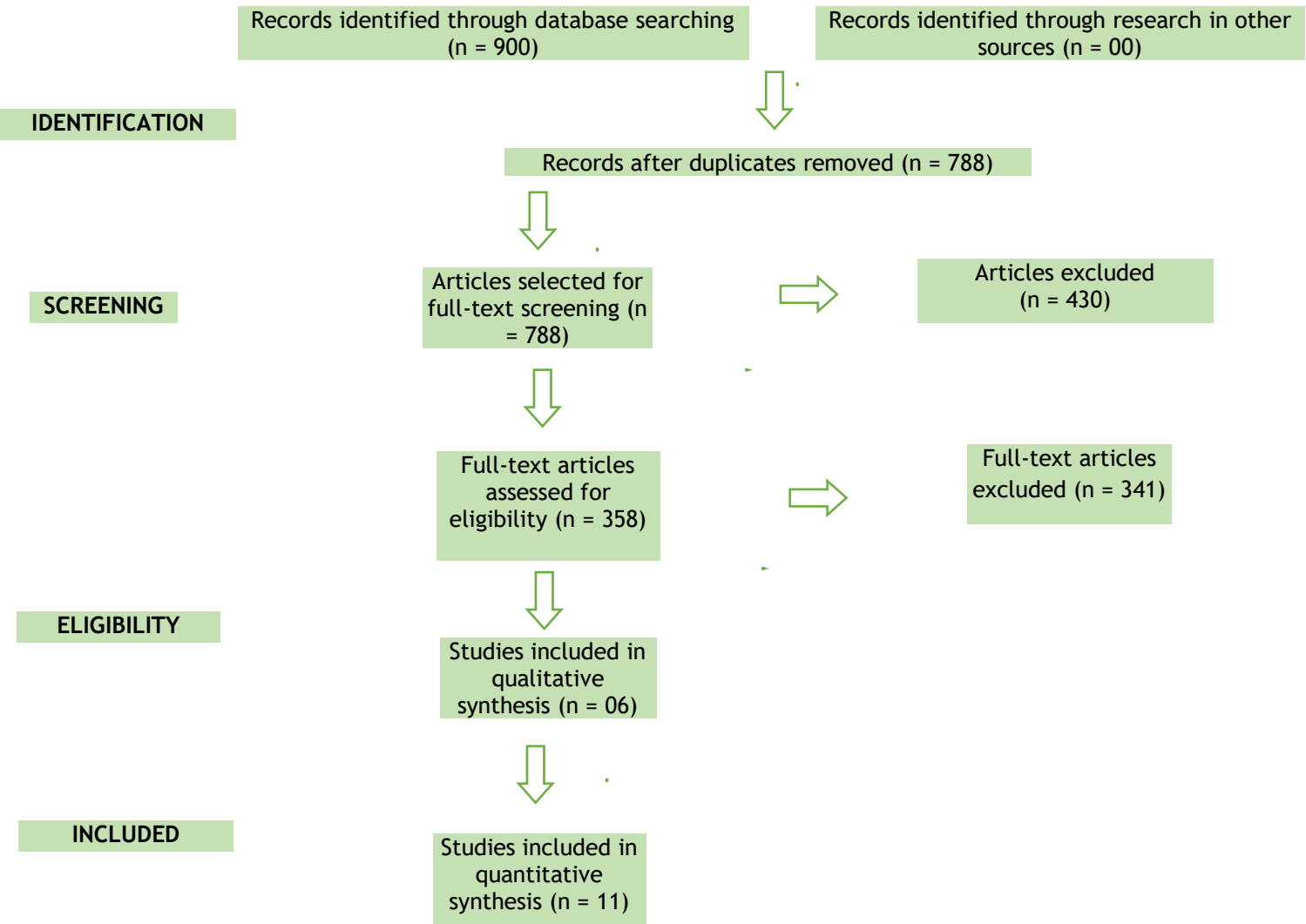


Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyzes (PRISMA 2009) flow diagram of studies. Fortaleza (CE), Brazil, 2018.

3ª Phase: Categorization of Studies

A data collection instrument was used for the analysis and subsequent synthesis of the articles that met the inclusion criteria, facilitating the identification of articles. The articles were identified by Arabic numbers, article titles, authors, years of publication, objectives, main results/discussions, and conclusions.

4ª Phase: Evaluation of Studies

Results and discussion are presented in a descriptive manner, which allows the assessment of the applicability of this study to achieve the integrative review's objectives.

5ª Phase: Interpretation of Results

The articles were discussed, and the main health care actions were identified responding to the guiding questions. Thematic categories that emerged from the texts were established. The categories were defined through exhaustive readings of the articles and the grouping was made according to the themes identified.

6ª Phase: Presentation of the Review

At this phase, we chose to elaborate figures that would classify the articles by the numbers used in the review, referring to the methodology and the objective of the studies.

RESULTS

Figure 2 shows the number of articles published in the last five years and selected through this integrative review. Most studies were found in the SciELO virtual library with eight articles, followed by the Scopus database, with four articles.

Databases	Number of articles
SciELO	08
Scopus	04
MEDLINE	03
BDENF	01
LILACS	01
Total	17

Figure 2. Databases and number of articles published in the last few five years. Fortaleza (CE), Brazil, 2018.

Figure 3 presents a summary of the articles selected through the integrative review.

No.	Authors	Titles	Objectives	Year	Database	Journals	Vancouver References
01	Vieira, Azevedo, Sampaio, Oliveira, Moraes, Mata ⁸	Nursing care for people with diabetes mellitus and high blood pressure: cross mapping	To identify care actions prescribed by nurses of the Family Health Strategy for hypertensive and diabetic patients and compare them with the NIC standardized language.	2017	BDENF	Revista Baiana de Enfermagem	11
02	Teston, Sales, Marcon ⁹	Perspectives of individuals with diabetes on selfcare: contributions for assistance	To know the perspectives of people with T2DM on self-care actions.	2017	SciELO	Escola Anna Nery	12

03	Odhayani, Tayel, Madi ¹⁰	Foot care practices of diabetic patients in Saudi Arabia	To identify patient awareness of risk factors for diabetic foot and explore knowledge and foot care practices among diabetic patients in a Saudi population.	2017	MEDLINE	Saudi Journal of Biological Sciences	13
04	Adarmouc, Elyacoubi, Dahmash, El Ansari, Sebbani, Amine ¹¹	Short-term effectiveness of a culturally tailored educational intervention on foot self-care among type 2 diabetes patients in Morocco	To assess the effectiveness of culturally adapted self-management education on the foot care of patients with T2DM, and identify factors associated with varying practices.	2017	Scopus	Journal of Clinical & Translational Endocrinology	14
05	Yusoff, Ishak, Rahman, Kadir ¹²	Diabetes self-care and its associated factors among elderly diabetes in primary care	To describe self-care among elderly subjects with diabetes and determine the associated factors.	2017	MEDLINE	Journal of Taibah University Medical Sciences	15
06	Al-Hariri, Al-Enazi, Alshammari, Bahamdani, Al-Khtani, Al-Abdulwahab ¹³	Descriptive study on the knowledge, attitudes, and practices regarding the diabetic foot	To evaluate knowledge, attitudes, practices, and risk factors that influence diabetic foot ulcers in diabetic patients attending a diabetic clinic in a Saudi hospital.	2017	MEDLINE	Journal of Taibah University Medical Sciences	16
07	Simon-Tuval, Shmueli, Harman-Boehm ¹⁴	Adherence to Self-Care Behaviors among Patients with Type 2 Diabetes – The Role of Risk Preferences	To examine whether the degree of risk aversion is associated with adherence to disease self-management among adults with T2DM.	2016	Scopus	Journal of Clinical & Translational Endocrinology	17
08	Coelho, Villas Boas, Gomides, Foss-Freitas, Pace ¹⁵	Self-care activities and their relationship to metabolic and clinical control of people with diabetes mellitus	To evaluate self-care activities and verify their relationship with sociodemographic, metabolic control, and clinical data of people with type T2DM.	2015	SciELO	Texto e Contexto Enfermagem	18
09	Rezende Neta, Silva, Silva ¹⁶	Adherence to foot self-care in diabetes mellitus patients	To analyze the self-care of patients with T2DM at the FHS in Teresina (PI).	2015	SciELO	Revista Brasileira de Enfermagem (REBEN)	19
10	Rossi, Silva, Fonseca ¹⁷	Adherence to drug treatment among people with type 2 diabetes mellitus	To evaluate patients registered with the FHS in a city in the countryside of Minas Gerais in regards with adherence to drug treatment.	2015	SciELO	Revista de Enfermagem do Centro Oeste Mineiro (RECOM)	20
11	Wendling, Beadle ¹⁸	The relationship between self-efficacy and diabetic foot self-care	To evaluate the relationship between the level of self-efficacy and performance of foot self-care in those with diabetes as they relate to the prevention of lower extremity amputation (LEA).	2015	Scopus	Journal of Clinical & Translational Endocrinology	21
12	Policarpo, Moura, Melo Junior, Almeida, Macêdo, Silva ¹⁹	Knowledge, attitudes and practices for the prevention of diabetic foot	To identify the knowledge, attitudes, and practices aimed at preventing diabetic foot in patients with T2DM.	2014	SciELO	Revista Gaúcha Enfermagem	22
13	Villas Boas, Foss-Freitas, Pace ²⁰	Adherence of people with type 2 diabetes mellitus to drug treatment	To investigate adherence to drug treatment and its relationship with clinical variables,	2014	SciELO	Revista Brasileira de Enfermagem (REBEN)	23

			treatment, and metabolic control among patients with T2DM in outpatient follow-up.				
14	Sousa, Macêdo, Moura, Silva, Vieira, Reis ²¹	Self-care and clinical parameters in patients with type 2 diabetes mellitus	To verify characteristics related to self-care and clinical parameters in patients with T2DM.	2014	LILACS	Revista da Rede de Enfermagem do Nordeste - Rene	24
15	Li, Yuan, Guo, Lou, Zhao, Shen, et al. ²²	The current status of foot self-care knowledge, behaviors, and analysis of influencing factors in patients with type 2 Diabetes Mellitus in China	To investigate knowledge and behaviors in self-care of feet in patients with T2DM.	2014	Scopus	International Journal of Nursing Science	25
16	Cubas, Santos, Retzlaff, Telma, Andrade, Moser, et al. ²³	Diabetic foot: orientations and knowledge about prevention care	To check the knowledge of the users of a diabetes program about preventive care for diabetic foot, identify the orientations that the patient receives about the prevention, and to observe adherence to preventive self-care procedures.	2013	SciELO	Fisioterapia em Movimento	26
17	Gomides, Villas-Boas, Coelho, Pace ²⁴	Self-care of people with diabetes mellitus who have lower limb complications	To evaluate self-care activities of people with DM who have ulcers and/or lower limb amputations.	2013	SciELO	Acta Paulista de Enfermagem	27

Figure 3. Synthesis of articles according to authors, title, objective, year, database, journal, and Vancouver reference. Fortaleza (CE), Brazil, 2018.

It was noticed, according to Figure 3, that most studies sought to assess, identify, and describe the self-care and diabetes management-related problems among patients with T2DM, and the health care provided to them.

Concerning the year of publication of the studies, most articles were published in 2017 with six articles (35.29%), followed by 2014 and 2015 with four articles (23.52%), 2013 with two articles (11.76%), and 2016 with one article (5.88%).

Codes	Countries	Results	Conclusions
01	Brazil	The following nursing care actions were observed: instructions for the use, administration, and storage of medications; diet and hydration; guidelines on the practice of stretching and physical activity; monitoring of glycemic control, blood pressure and weight; diabetic foot care; and psychosocial and spiritual care.	The data showed that self-care activities related to behavioral changes require greater investments to achieve the goals of care; the age and time of diagnosis should be considered when planning nursing care for people with DM.
02	Brazil	Concerning self-care, patients reported knowing the need for care regarding diet, physical activity, and stress reduction.	There is a need to raise awareness regarding the development of skills for self-care.
03	Saudi Arabia	The findings revealed that some patients were unaware of the diabetic foot and future complications. Patients were unaware of the risk factors for DM, and foot care practice was lacking.	Awareness programs should be mandatory in all diabetes hospitals and clinics to minimize the lack of awareness and educational foot care services.
04	Morocco	The multivariate analysis showed that low education was associated with deficit in foot self-care.	There was a general improvement in foot care practices after the intervention. The findings suggest the role of literacy and previous patient education in the observed

			variation. Culturally adapted interventions targeting other domains of disease management are necessary for the Brazilian context.
05	Malaysia	Factors with a positive impact on diabetes self-care are listed. Family was seen as a caregiver, with a high degree of support and acceptable or good knowledge of diabetes. The presence of neuropathy negatively affected self-care, while neuropathy had a positive impact on self-care.	The elderly with T2DM at the HUSM obtained a moderate score of self-care based on MEDSCaQ. Good diabetes self-care determinants include race, social support, care during periods of illness, and knowledge about diabetes and diabetic microvascular complications.
06	Saudi Arabia	Regarding the knowledge of diabetic foot, most participants had a good education and favorable attitudes. Interestingly, the results showed that, despite these characteristics, a high percentage of participants ignored important information and instructions before purchasing new shoes.	Levels of knowledge, attitudes, and practices must be improved. Such improvement can be achieved by developing an awareness program for early detection and care of foot problems caused by diabetes at home.
07	Israel	Multivariate alerts revealed that patients reported less adherence to eat fruits and vegetables, having lower risk for diabetic foot than those who consumed high-fat content, who had a 96% chance of having diabetic foot complications.	Health professionals sought a strategy to improve non-adherence to foods with fat content and encourage healthy eating (diet rich in vegetables and fruits), in addition to glycemic control.
08	Brazil	The most significant adherence to drug treatment was related to "taking insulin injections as recommended", and the lowest adherence was related to "perform specific physical exercise".	Educational strategies are necessary to sensitize both diabetic patients and health professionals for the prevention of diabetic foot.
09	Brazil	Adherence to care in examining the feet, observing the inside of shoes, and drying the interdigital spaces was superior in the group that received guidance from nurses on these aspects.	The data suggested that the continuous monitoring of these patients can contribute to self-care activities. Presence of ulcers limits the practice of physical activity.
10	Brazil	It was evidenced that, of the 437 participants, 54.0% had forgotten to take the oral antidiabetic medications, 64.1% had taken them at different times than that determined by the medical prescription. Besides, 82.4% reported never having stopped taking oral medications due to a feeling of improvement.	The items with the lowest adherence are simple and subject to correction. Individual assessment and monitoring are necessary, considering the degree of knowledge and the ease with which to process the information. A multi-professional action could enhance the guidelines and increase adherence.
11	USA	The comparison of self-efficacy between men and women with diabetic feet revealed that men scored more than women.	This study contributed to the knowledge about self-efficacy and diabetic foot self-care considering the behavioral habits of patients.
12	Brazil	Knowledge of diabetic patients and preventive foot care. Insufficient knowledge was identified concerning correct hygiene, ideal drying, inspection of the feet, ideal footwear, and correct nail cutting. Regarding ulcer preventive measures, patients with T2DM adhered to feet hydration if a moisturizer or oil were offered.	The perspective of performing self-care actions constitutes a challenge to care. Patients need to recognize their fundamental role in the development of these actions so that nurses can support them in the process of behavior change.
13	Brazil	The most frequent drug treatment was the association of insulin with oral antidiabetics. As for insulin, the most used type was NPH.	There were no statistically significant correlations between adherence and metabolic control variables. The results differ from the literature regarding the rate of adherence to drug treatment in chronic diseases and the correlation between adherence and drug regime's complexity, which points to the need for further studies on this topic.
14	Brazil	Both sexes performed the capillary glycemia checking. Regarding blood glucose monitoring, 56.5% of men and 60.6% of women reported knowing the importance of this practice.	Primary nursing care actions prescribed during the assistance to hypertensive and diabetic patients were identified. These actions were equivalent to 67 NIC interventions.
15	China	The knowledge of self-care with the feet was medium, and the self-care behavior was inadequate. The status of knowledge and behavior was influenced by education, duration of DM, periodic inspection, and education on diabetic complications.	The status of knowledge and self-care behaviors with the feet is not optimistic. According to the patients' characteristics, the theory of knowledge, attitude, and practice apply to encourage patients to make periodic inspections and education about complications to improve knowledge and self-care behaviors.
16	Brazil	The main guidelines raised about foot self-care were: foot examination and daily hygiene; suitable footwear characterized by comfort, seamless and adequate size; use of clear or white and cotton socks, without seams; foot hydration; nail cutting; walking barefoot, and	It is necessary that the professionals who integrate the FHS be permanently trained to encourage this clientele to perform self-care and to adhere to the treatment to minimize the risks of developing complications of DM, providing a better quality of life.

		keeping the feet immersed in warm water.	
17	Brazil	It was pointed out that the risk of developing foot ulcers was predominant in males. Self-care, drug treatment, self-monitoring of capillary glycemia, and low adherence to physical activity and diet plans prevailed.	The need for nursing actions to improve self-care and control clinical parameters in these patients is highlighted.

Figure 4. Summary of articles according to country, results, and conclusions. Fortaleza (CE), Brazil, 2018.

It was observed that the country that stood out in the publications was Brazil, with ten articles, followed by Saudi Arabia, with two articles and, subsequently, China, Morocco, United States, and Malaysia, with an article each. The studies showed in their results that the main health care actions are orientations about the use, administration, and storage of medications; attention to diet and hydration; guidelines on the practice of stretching and physical activity; and care regarding glycemic control and body weight. Through the reading of the analyzed articles, it was found that the researchers addressed themes that were contemplated in three categories.

DISCUSSION

This section was divided based on what was found in each of the three categories, and presents a critical analysis based on the literature.

Category 1 - Medication use, administration and storage, and glycemic control

In this category, six articles^{1, 8, 10, 13, 14, 17} emphasized care related with the administration and storage of medications, and with glycemic control. It was found that article one addressed care actions related with medication use and storage, glycemic control, and diabetic foot.

Article eight discussed the orientation of patients to adhere to drug treatment and insulin injections. In article ten, the need for adequate individual assessment and follow-up, and the importance of knowing the patients that are not adhering to the treatment was highlighted. Concerning article 13, the most frequent drug treatment was the association of insulin with oral medications. As for insulin, it is noteworthy that the most used type was Neutral Protamine Hagedorn (NPH). The types of insulin and their combinations were also described in this article, but the main guidelines were not explained such as the routine aspiration. In this way, guidelines were investigated in the literature to complement the gaps that were not addressed.

Articles 14 and 17 reported actions related with the use of medications and capillary blood glucose self-monitoring. Gaps were detected in the guidelines for storage and insulin administration site rotation. In this sense, other national references were sought to subsidize this category.

The lack of information from the population on the proper conditions of use and storage can affect the effectiveness and safety of medications and generate serious health problems, such as incorrect medication intake, risk of intoxication, lack of adequate care, low storage and expiration of products.²⁵ It is therefore necessary that patients and health professionals make periodic inspections of medicines used in a regular basis so that those expired and those with apparently

altered quality are discarded. Thus, the most frequent nursing interventions prescribed by nurses for patients with diabetes are: instruct patient on the correct storage of insulin; instruct patient about the need to take the medications at the correct times, as prescribed; educate patient on the correct rotation of injection sites when administering insulin, and emphasize the importance of regular blood glucose checking.

It should be noted that the adequate storage of medicines aims to ensure their quality so that the patient benefits from the desired therapeutic action, in addition to minimizing the occurrence of possible adverse reactions.²⁵

Thus, drugs must be stored in ideal conditions and locations, thus not affecting their stability. Temperature is pointed out as the main factor responsible for altering medications. Therefore, it is known about insulins' storage that they present good stability and have preserved action, as long as they are adequately preserved according to the manufacturer's recommendations. Also, there are differences in conservation and validity between the insulin in use and the sealed one to maintain potency and stability.¹

Insulin is a hormone produced by the pancreas, being responsible for transporting glucose into cells, whose inefficiency or scarcity results in the presence and continuous circulation of glucose in the blood. This problem, over time, progressively causes harmful systemic effects, which can lead to chronic disabling limitations or, in more severe cases, life-threatening illness, involving macro and microvascular complications with a negative impact on patients' quality of life.³

It is emphasized that insulins are standardized and distributed by the Brazilian Ministry of Health. NPH and regular insulins have been distributed until now, pending the inclusion of a fast-acting analog for children and adolescents. It is pointed out, however, that NPH insulin is the first choice among insulins for basal glycemic control in Brazil and it is available in the Unified Health System (SUS in Portuguese).¹

It is observed, however, that NPH (intermediate-acting) insulins require several hours to reach adequate therapeutic levels, and that their use in diabetic patients requires short-acting insulin supplements for glycemic control after meals. It is noted that the ultra-fast analog insulins and the regular fast-acting insulin can be mixed in the same syringe with NPH without affecting its absorption, provided that the fast-acting (R) or ultra-fast insulin is aspirated before the intermediate-action insulin.¹

Concerning the application sites, correct rotation of injection sites is a decisive factor for safe and effective insulin treatment, preventing lipohypertrophy and poor glycemic control.¹ However, when this practice is performed indiscriminately, it causes important variability in insulin absorption, making glycemic control difficult. Thus, professionals should plan and agree with the

insulin user or family members/caregivers. For this planning to be effective, it is necessary to consider the number of applications per day, daily activities, physical exercises, schedules, and other factors that interfere with insulin absorption speed. Therefore, to organize the rotation, it is recommended to divide each recommended application site into small quadrants. Applications in these quadrants must be spaced at least one centimeter from each other and follow the clockwise orientation. In case of multiple applications, a different injection site/quadrant must be chosen at each time. For one or two applications a day, the same site can be used, alternating the right and left sides and quadrants.¹

The rotation of injection sites must be performed once a week, exhausting the possibilities of quadrants in the same region.³ This recommendation is not easily executed for multiple daily applications considering the care regarding the rotation planning. Therefore, after applying insulin at a certain site, it is recommended to avoid it for 14 days (the necessary healing time), also preventing lipohypertrophy. It is pointed out that the health professional should check the rotation scheme at each visit and review the plan whenever necessary.

Category 2 - Patient Self-Care and Foot Care

For the second category, it was evident that ten studies^{1, 3, 4, 6, 9, 11, 12, 15, 16, 17} report foot care information. In this sense, article one addresses the guidelines on how to perform foot evaluation and hydration. Articles 3, 4, 9, 12, and 16 emphasize the same foot care actions, including orientations about checking the inside of shoes before use, drying the interdigital spaces after washing the feet, inspecting the feet, using adequate shoes, performing proper nail cutting, and moisturizing the feet.

As for article six, the authors assessed patients' knowledge of diabetic foot and found that the vast majority still ignore vital information and instructions before purchasing new shoes. Articles 11, 12, 15, and 17 addressed the comparison of self-efficacy between men and women with diabetic feet, foot self-care, and knowledge of foot self-care. It was observed that article 16 stressed care with appropriate shoes, characterized by comfort, absence of sewing and adequate sizing, use of white or cotton and white socks, foot hydration, nail cutting, and soaking the feet in warm water.

Therefore, health professionals, especially nurses, must improve the adherence of diabetic patients to self-care activities by providing basic guidelines to reduce morbidity and mortality due to diabetes-related complications. In this perspective, the performance of primary care professionals stood out since they are responsible for the vast majority of health actions, including the monitoring of people with DM.¹⁶

It is also necessary that nurses offer educational support regarding foot care according to individual needs to prevent ulcers and amputations.²⁶ Thus, it appears that the nursing prescription

and teaching should be implemented to avoid possible complications, whether physical or emotional.

Therefore, it is assessed that foot care is one of the directions of self-care for patients with DM2. Thus, daily foot inspection is considered indispensable in order to detect early minor traumas or signs that the footwear is inadequate.¹⁶

Category 3 - Food Care, Physical Activity Practice, Body Weight and Family Support

Six articles (1, 2, 5, 7, 8, and 17) fit this category that addresses physical activity, diet, and body weight. However, they reported the importance of physical activity as a way of maintaining body weight and reducing stress. It is noteworthy that articles 1, 2, 7, and 8 addressed nutrition and hydration, guidelines on the practice of stretching and physical activity, and diet intake (emphasizing the importance of fruits and vegetables for a healthy diet). In this context, it is observed that nursing care that stimulates lifestyle changes, such as adopting healthy eating habits and regular physical activity, is vital to reduce the risk and morbidity of this disease when considering the improvement in blood glucose levels.¹⁵

Article one also shows the most general guidelines of nursing professionals related to diet and physical activity to T2DM patients, as follows: instruct patient to feed every three hours, instruct patient to practice stretching and physical activities, explain the importance of physical activity for the glycemic control and general well-being, instruct patient to walk in flat surfaces, and encourage participation in physical activity groups at the health facilities.

It was found that treatment adherence was the greatest challenge for patients with T2DM due to the considerable change in lifestyle imposed by the treatment itself. With this, it is pointed out that patients with T2DM need full support from a multidisciplinary health team. In this way, they can adhere to the treatment and adequately manage the disease and improve their clinical status and quality of life.²⁷

A national study describes the annual prevalence of overweight and obesity in the adult population of the capitals of the 26 Brazilian states and the Federal District, between 2006 and 2012. The study shows that overweight in the adult population increased from 43.2% in 2006 to 51% in 2012, and obesity increased from 11.6% to 17.4% in the same period.²⁸

In article 17, low adherence to physical activity and to a diet plan was emphasized. Low adherence to a diet was associated with factors such as food restriction, long duration of the plan, interference in family habits, demand for high-cost foods, and the need for extra time for preparation. Regarding the practice of physical activity, the studies showed that the reasons given for the abandonment of this adherence were discouragement, discomfort, little time available, ignorance, lack of interest, medical restriction, and hypoglycemia, among others.²³

Among the 17 articles, only article five emphasized the family as a care provider. It should be noted that family support for patients with T2DM has a crucial role in the patients' care. The study showed that greater family participation in the treatment of patients with DM might facilitate adaptation to the disease and care, preventing and/or delaying the onset and worsening of acute and chronic complications. A study shows that the family's resilience, supported by religion, friends, school and health team contributed to the development of strategies to cope with chronic illness and adversities that permeate diabetes care.²⁹

Therefore, it is necessary to understand the health and disease process and consider that the individual has a family and social context. Besides, it is pointed out that health institutions, which offer care to these patients, need to have a professional qualification to have a satisfactory performance from the reception to the execution of educational activities or procedures. It is considered essential, with regard to therapy, to have a line of care aimed at diabetes, which must guarantee a multiprofessional approach as well as drugs and routine exams within the scope of SUS.

CONCLUSION

The results found were able to answer the guiding questions and the integrative review's objectives. The main results were related to health care for patients with DM2, with a focus on encouraging self-care, emphasizing preventive care such as daily inspection, foot hygiene and hydration, in addition to encouraging the practice of regular physical activity, blood glucose monitoring, body weight assessment, and the proper use of shoes.

It is advised, in this context, that nurses should develop educational activities, being aware of the role of educator they should play. Therefore, the performance of Nursing professionals in the care of these patients through technical, scientific knowledge and humanization of care, provide quality assistance aimed at promoting, maintaining, and recovering health, considering the human being in its entirety, thus enabling the patient's well-being in the emotional, physical, and psychological spheres, as well as family orientation.

Thus, it is considered necessary to provide comprehensive care to the individual, since health education is a facilitating resource for the patient to understand the need for adherence to treatment, and to improve the quality of life, through acceptance and living with the diagnosis of DM.

The main study's limitation is the difficulty in using some articles in an international language. Despite this, it is argued that the study contributed to a better reflection on the role of nurses in preventing future complications related to DM. It is also emphasized the need for further research to deepen this theme that still challenges the scientific community.

REFERENCES

1. Sociedade Brasileira de Diabetes. Diretrizes da Sociedade Brasileira de Diabetes 2019-2020 [Internet]. São Paulo: SBD; 2019 [cited 2020 Apr 14]. Available from: <https://www.diabetes.org.br/profissionais/images/DIRETRIZES-COMPLETA-2019-2020.pdf>
2. Gallani MCBJ. The nurse in the context of chronic disease. *Rev Latino-Am Enfermagem*. 2015 Jan/Feb; 2(1):01-2. DOI: 10.1590/0104-1169.0000.2517
3. American Diabetes Association. Classification and Diagnosis of Diabetes. *Diabetes Care*. 2017 Jan; 40(1):S11-24. DOI: [10.2337/dc17-S005](https://doi.org/10.2337/dc17-S005)
4. Brandão LM, Ferreira A, Barreiros C, Silva D, Rodrigues J, Rodrigues C, et al. Profiling and case study of patients in a diabetology visit. *Medicina Interna*. 2018 Apr/June; 25(2):100-6. DOI: 10.24950/rspmi/original/253/2/2018
5. Barbosa CB, Sousa FGM, Leite JL. Scoring interventions in family relations regarding the care for the child with a chronic condition. *Texto contexto-enferm*. 2015 Jan/Mar; 24(1):87-95. DOI: 10.1590/0104-07072015001820013
6. Mendes KDS, Silveira RCCP, Galvão CM. Integrative literature review: a research method to incorporate evidence in health care and nursing. *Texto contexto-enferm*. 2008 Oct/Dec; 17(4):758-64. DOI: 10.1590/S0104-07072008000400018
7. Galvão TF, Pansani TSA, Harrad D. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *Epidemiol Serv Saúde*. 2015 Apr/June; 24(2):335-42. DOI: 10.5123/S1679-49742015000200017
8. Vieira VAS, Azevedo C, Sampaio FC, Oliveira PP, Moraes JT, Mata LRF. Nursing care for people with diabetes mellitus and high blood pressure: cross mapping. *Rev Baiana Enferm*. 2017; 31(4):e21498. DOI: 10.18471/rbe.v31i4.21498
9. Teston EF, Sales CA, Marcon SS. Perspectives of individuals with diabetes on selfcare: contributions for assistance. *Esc Anna Nery Rev Enferm*. 2017 Apr; 21(2):e20170043. DOI: 10.5935/1414-8145.20170043
10. Odhayani AA, Tayel SS, Madi F. Foot care practices of diabetic patients in Saudi Arabia. *Saudi J Biol Sci*. 2017 Nov; 24(7):1677-71. DOI: 10.1016/j.sjbs.2015.12.003
11. Adarmouc L, Elyacoubi A, Dahmash L, El Ansari N, Sebbani M, Amine M. Short-term effectiveness of a culturally tailored educational intervention on foot self-care among type 2 diabetes patients in Morocco. *J Clin Transl Endocrinol*. 2017 Feb; 7:54-9. DOI: 10.1016/j.jcte.2017.01.002

12. Yusoff SSM, Ishak NH, Rahman RA, Kadir AA. Diabetes self-care and its associated factors among elderly diabetes in primary care. *J Taibah Univ Med Sci*. 2017 June; 12(6):504-11. DOI: 10.1016/j.jtumed.2017.03.008
13. Al-Hariri MT, Al-Enazi AS, Alshammari DM, Bahamdah AS, Al-Khtani SM, Al-Abdulwahab AA. Descriptive study on the knowledge, attitudes and practices regarding the diabetic foot. *J Taibah Univ Med Sci*. 2017 Mar; 12(6):492-6. DOI: 10.1016/j.jtumed.2017.02.001
14. Simon-Tuval T, Shmueli A, Harman-Boehm I. Adherence to Self-Care Behaviors among Patients with Type 2 Diabetes – The Role of Risk Preferences. *Value Health*. 2016 Sept; 19(6):844-51. DOI: 10.1016/j.jval.2016.04.003
15. Coelho ACM, Villas Boas LCG, 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*. 2015 July/Sept; 24(3):697-705. DOI: 10.1590/0104-07072015000660014
16. Rezende Neta DS, Silva ARV, Silva GRF. Adherence to foot self-care in diabetes mellitus patients. *Rev Bras Enferm*. 2015 Jan/Feb; 68(1):111-6. DOI: 10.1590/0034-7167.2015680115p
17. Rossi VEC, Silva AL, Fonseca GSS. Adherence to drug treatment among people with type 2 diabetes mellitus. *R Enferm Cent O Min [Internet]*. 2015 Sept/Dec [cited 2018 May 04]; 5(3):1820-30. Available from: <http://www.seer.ufsj.edu.br/index.php/recom/article/view/890/934>
18. Wendling S, Beadle V. The relationship between self-efficacy and diabetic foot self-care. *J Clin Transl Endocrinol*. 2015 Jan; 2(1):37-41. DOI: 10.1016/j.jcte.2015.01.001
19. Policarpo NS, Moura JRA, Melo Junior EB, Almeida PC, Macêdo SF, Silva ARV. Knowledge, attitudes and practices for the prevention of diabetic foot. *Rev Gaúcha Enferm*. 2014 Sept; 35(3):36-42. DOI: 10.1590/1983-1447.2014.03.45187
20. Villas Boas LCG, Foss-Freitas MC, Pace AE. Adherence of people with type 2 diabetes mellitus to drug treatment. *Rev Bras Enferm*. 2014 Mar/Apr; 67(2):268-73. DOI: 10.5935/0034-7167.20140036
21. Sousa JT, Macêdo SF, Moura JRA, Silva ARV, Vieira EES, Reis AS. Self-care and clinical parameters in patients with type 2 diabetes mellitus. *Rev Rene*. 2015 July/Aug; 16(4):479-5. DOI: <http://10.15253/2175-6783.2015000400004>
22. Li R, Yuan L, Guo XH, Lou QQ, Zhao F, Shen L, et al. The current status of foot self-care knowledge, behaviours, and analysis of influencing factors in patients with type 2 diabetes mellitus in China. *Int J Nurs Sci*. 2014 Sept; 1(3):266-71. DOI: 10.1016/j.ijnss.2014.05.023
23. Cubas MR, Santos OM, Retzlaff EMA, Telma HLC, Andrade IPS, Moser ADL, et al. Diabetic foot: orientations and knowledge about prevention care. *Fisioter Mov*. 2013 July/Sept; 26(3):647-55. DOI: 10.1590/S0103-51502013000300019

24. Gomides DS, Villas-Boas LCG, Coelho ACM, Pace AE. Self-care of people with diabetes mellitus who have lower limb complications. *Acta Paul Enferm.* 2013; 26(3):289-93. DOI: 10.1590/S0103-21002013000300014
25. Baldoni AO, Gontijo JD, Silva VKC, Fernandes MR, Alvim CP, Ferreira SM, et al. Storage and drug disposal: education strategy and profile of discarded drug. *R Eletr Extensão.* 2015; 12(20):48-61. DOI: 10.5007/1807-0221.2015v12n20p48
26. Alencar DC, Costa RS, Alencar AMPG, Moreira WC, Ibiapina ARS, Alencar MB. Nursing consultation in the perspective of users with diabetes mellitus in the family health strategy. *J Nurs UFPE on line.* 2017 Oct; 11(10):3749-56. DOI: 10.5205/reuol.12834-30982-1-SM.1110201707
27. Assunção SC, Fonseca AP, Silveira MF, Caldeira AP, Pinho L. Knowledge and attitude of patients with diabetes mellitus in Primary Health Care. *Esc Anna Nery Rev Enferm.* 2017 Nov; 21(4):e20170208. DOI: 10.1590/2177-9465-ean-2017-0208
28. Souza JD, Baptista MHB, Gomides DS, Pace AE. Adherence to diabetes mellitus care at three levels of health care. *Esc Anna Nery Rev Enferm.* 2017 Oct; 21(4):e20170045. DOI: 10.1590/2177-9465-ean-2017-0045
29. Pennafort VPS, Queiroz MVO, Nascimento LC, Guedes MVC. Rede e apoio social no cuidado familiar da criança com diabetes. *Rev Bras Enferm.* 2016 Sep/Oct; 69(5):912-9. DOI: 10.1590/0034-7167-2015-0085

Correspondence

Eysler Gonçalves Maia Brazil

Email: eyslerbrasil@unilab.edu.br

Submission: 17/04/2020

Accepted: 21/12/2020

Copyright © 2021 Journal of Nursing UFPE on line/JNUOL.



This is an open access article distributed under the CC BY 4.0 assignment [Creative Commons Attribution-ShareAlike 4.0 International License](https://creativecommons.org/licenses/by/4.0/), which allows others to distribute, remix, adapt and create from their work, even for commercial purposes, as long as they give it due credit for the original creation. It is recommended to maximize the dissemination and use of licensed materials.