Factors That Influence the Self-management of Diabetes Mellitus and Insulin Therapy: Integrative Review of the Literature

Fatores Que Influenciam na Autogestão do Diabetes Mellitus e da Insulinoterapia: Revisão Integrativa da Literatura
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RESUMO
OBJETIVO: Compreender os fatores que influenciam na autogestão do diabetes Mellitus e insulinoterapia. **MÉTODO:** Trata-se de uma revisão integrativa da literatura, utilizando a estratégia PICo. A pesquisa embasou-se na questão: "Quais são os fatores que influenciam a autogestão eficaz do diabetes e da insulinoterapia em pessoas com diabetes?". Os descritores e palavras-chave foram extraídos dos Descritores em Ciências da Saúde. O levantamento foi realizado através do Portal de Periódicos da Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES). **RESULTADOS:** Os fatores que mais influenciaram na autogestão do diabetes foram os socioeconômicos, clínicos e interpessoais. Quanto a insulinoterapia, os fatores que também influenciaram foram a carga cognitiva em gerenciar a condição, o pouco conhecimento sobre o manuseio e a técnica de aplicação da insulina, e a dificuldade em modificar comportamentos. **CONCLUSÃO:** Evidencia-se a necessidade em subsidiar recursos que contribuam com a autogestão.
DESCRITORES: Autocuidado; Autogestão; Diabetes Mellitus.

ABSTRACT
OBJECTIVE: To understand the factors that influence the self-management of diabetes mellitus and insulin therapy. **METHOD:** This is an integrative literature review, using the PICo strategy. The research involves the questão: "What are the factors that influence effective self-management of diabetes and insulin therapy in people with diabetes?" The descriptors and key words are extracted from the Descriptors in Health Sciences. The survey was carried out through the Portal de Periódicos da Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES). **RESULTS:** The factors that most influence the self-management of diabetes are socioeconomic, clinical and interpersonal. Regarding insulin therapy, the factors that also influence the cognitive load in managing the condition, the lack of knowledge about the manuse and the insulin application technique, and the difficulty in modifying behaviors**. CONCLUSION:** Evidence is that it is necessary to subsidize resources that contribute to self-management.
DESCRIPTORES: Self Care; Self-Management; Diabetes Mellitus.

RESUMEN
OBJETIVO: Comprender os factores que influyen en la autogestão de la diabetes mellitus y la insulinoterapia. **MÉTODO:** Trata-se de una revisión integrativa de la literatura, utilizando una estrategia PICo. A pesquisa embasou-se na questão: "¿Quais são os fatores que influenciam a autogestão eficaz do diabetes e da insulinoterapia em pessoas com diabetes?". Os descritores e palavras-chave foram extraídos dos Descritores em Ciências da Saúde. El levantamiento realizado a través del Portal de Periódicos da Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES). **RESULTADOS:** Los factores que más influyen en la autogestión de la diabetes en los foros socioeconómicos, clínicos e interpesados. Cuando la insulinoterapia, los factores que también influyen en la carga cognitiva en la gerencia de la condición, el poco conocimiento sobre el uso y la técnica de aplicación de la insulina, y la dificultad para modificar el comportamiento. **CONCLUSÃO:** Evidencia-se a necessidade em subsidiar recursos que contribuam com a autogestão.
DESCRIPTORES: Autocuidado; Automanejo; Diabetes Mellitus.

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INTRODUCTION

Diabetes Mellitus (DM) is a chronic non-communicable disease, considered a serious global public health problem, especially due to its high potential to cause complications that compromise people's quality of life and well-being. By 2021, the disease affected more than 537 million adults (20 to 79 years old) worldwide, 62 million of which were in the Americas alone. [1] In Brazil, around 35% of the population aged between 25 and 64 years has been diagnosed with DM, and projections indicate an increase of 11.3 million cases in less than a decade. [2]

Once established, DM can lead to negative outcomes such as physical disabilities or death, in addition to considerably increasing costs to the health system. The estimated number of deaths in 2021 exceeded 6.7 million records, being higher in low- and middle-income countries, such as Brazil. [1]

Treatment is essential to minimize risks and related complications. If not treated correctly, DM causes high circulating blood glucose levels, resulting in microvascular and macrovascular dysfunctions, such as diabetic nephropathy, retinopathy, neuropathy, cardiovascular disease, lower limb amputation and blindness. [3]

In this context, to prevent these conditions, health management is necessary. DM self-management emerges as a fundamental strategy to reduce complications and improve patients' quality of life. It is a low-cost care model that gives people with the disease the opportunity to take the lead, mitigating disease progression and reducing complications through lifestyle changes. [4] More clearly, self-management comprises the individual's own ability to manage symptoms, treatment, lifestyle and psychological impacts through their behavior, with or without the collaboration of their support network. [5]

Self-management interventions transform the patient into an active being in their self-care and strengthen the professional-patient bond, providing shared decision-making and collaborative goals, through actions that reflect self-care behaviors, healthy eating, being active, blood glucose monitoring, medication adherence, risk reduction, problem-solving and dealing with the condition in a healthy way. [6]

The choice of treatment will depend on the subtype of the disease and the patient's needs. When, for example, there is no possibility or success in managing the disease through lifestyle changes and the use of oral antidiabetic drugs, insulin therapy should be started. However, insulin therapy requires strict care in its administration, as inadequate use can compromise its effectiveness and safety. [7]

In addition to regulating glucose, insulin therapy also requires a multidisciplinary approach to educate and empower patients and caregivers in the correct use of insulin, dose management, proper storage, administration via syringes, pens or insulin

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pumps, and in the recognition and treatment of hypoglycemia, a potentially serious complication associated with treatment. [7]

Health professionals who work to promote self-care are essential to involve patients through shared and collaborative goals that promote motivation on an individualized basis. However, achieving the goal of glycemic control is a common challenge among people with DM on insulin therapy, due to poor knowledge of the therapy, fear of hypoglycemia, weight gain, physical impacts, adaptation to an adequate diet, distress-anxiety-depression, social stigmas, responsibility to achieve treatment goals, and cultural beliefs. [8]

In this context, although DM is a highly prevalent condition, it still represents a major cause of morbidity and mortality associated with the consequences of ineffective glycemic control related to difficulties in managing insulin therapy, which has a growing trend worldwide. Therefore, it is necessary to explore the evidence to better understand the aspects that influence self-management of insulin therapy, providing a fundamental theoretical and empirical basis for the analysis of interventions aimed at improving the practice of self-management of insulin therapy, enabling advances in the quality of care provided and in the autonomy of individuals living with diabetes.

Therefore, to deepen the understanding of the factors that contribute to the effectiveness of self-management of insulin therapy, the following guiding question was listed: What are the factors that influence the effective self-management of diabetes and insulin therapy in people with diabetes? Therefore, the objective of the research is to review the existing literature on the factors that influence self-management of DM and insulin therapy, highlighting the importance of support and health education for the development of skills and knowledge necessary among patients for safe and effective care.

METHODS

This is an integrative literature review. The sample extraction used the PICo strategy, which is based on three components: Population/Problem (P), Phenomenon of Interest (I), and Context (Co). In this study, (P) refers to people with diabetes mellitus (DM), (I) to self-management, and (Co) to diabetes and insulin therapy. In this context, the review was guided by the following guiding question: What are the factors that influence effective self-management of diabetes and insulin therapy in people with diabetes?

Original/primary studies (quantitative and qualitative) published between January 2019 and September 2024 were included. The articles should contain descriptors in the title, be freely available in full, and involve insulin-dependent people with type 1 or 2 diabetes, with no age restriction.

Case studies, case reports, and reviews were not considered, since they have low evidence regarding the provision of relevant data on clinical safety outcomes. Theses, dissertations, monographs, abstracts published in proceedings of scientific events, book chapters and other similar documents were not considered. In addition, studies investigating other therapies that did not explore self-management of insulin therapy and that addressed gestational diabetes were excluded.

The bibliographic survey took place in October 2024, through the Journal Portal of the Coordination for the Improvement of Higher Education Personnel (CAPES). The searches were carried out in the Pubmed databases via Medical Literature Analysis and Retrieval System on-line (MEDLINE), Web of Science™, and the Latin American Literature of Health Sciences (LILACS) and the Nursing Database (BDENF) were also used, via the Virtual Health Library (VHL). To perform the search, controlled descriptors indexed in the Health Sciences Descriptors (DeCS) vocabulary and the keyword "Insulin therapy" were selected. The search strategies generated through the combination of the Boolean operator "AND" are presented below, in Table 1.

Table 1 - Search strategies generated in the databases used.

Database	Search strategies	Recovered articles
Pubmed	(Diabetes Mellitus[Title]) AND (Self-management[Title])	141
	(Diabetes Mellitus[Title]) AND (Self-care[Title])	115
	(Self-Management[Title]) AND (Insulin therapy[Title])	06
	(Self-care[Title]) AND (Insulin therapy[Title])	-
	(Self-Management[Title]) AND (Insulin[Title])	25
	(Self-care[Title]) AND (Insulin[Title])	04

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LILACS /BDENF	ti:((ti:(diabetes mellitus)) AND (ti:(self-management))) AND db:("LILACS" OR "BDENF") AND (year_cluster:[2019 TO 2024]) AND instance:"regional"	07
	ti:((ti:(diabetes mellitus)) AND (ti:(self-care))) AND db:("LILACS" OR "BDENF") AND (year_cluster:[2019 TO 2024]) AND instance:"regional"	69
	ti:((ti:(self-management)) AND (ti:(insulin therapy))) AND db:("LILACS" OR "BDENF") AND (year_cluster:[2019 TO 2024]) AND instance:"regional"	-
	(ti:((ti:(self-care)) AND (ti:(insulin therapy))) AND db:("LILACS" OR "BDENF") AND (year_cluster:[2019 TO 2024]) AND instance:"regional"	-
	(ti:(self-management)) AND (ti:(insulin)) AND db:("LILACS" OR "BDENF") AND (year_cluster:[2019 TO 2024]) AND instance:"regional"	03
	(ti:(self-care)) AND (ti:(insulin)) AND db:("LILACS" OR "BDENF") AND (year_cluster:[2019 TO 2024]) AND instance:"lilacsplus"	04
Web of Science	(TI=(Diabetes Mellitus)) AND TI=(Self-management)	162
	(TI=(Diabetes Mellitus)) AND TI=(Self-care)	145
	(TI=(Self-Management)) AND TI=(Insulin therapy)	07
	(TI=(Self-care)) AND TI=(Insulin therapy)	01
	(TI=(Self-Management)) AND TI=(Insulin)	32
	(TI=(Self-care)) AND TI=(Insulin)	05

Source: prepared by the authors (2024).

The study selection process was carried out in three stages. Initially, the search data were exported and compiled using the Rayyan software to remove duplicates. In the second stage, two independent reviewers analyzed the retrieved titles and abstracts to exclude studies that did not answer the research question, that met the exclusion criteria, and that did not address the proposed topic. In the third stage, the full texts of potentially relevant studies were evaluated according to the inclusion criteria. Any disagreements between the reviewers were resolved by consensus or, when necessary, by a third reviewer.

Data from the included studies were extracted using a pre-determined form. The following information was collected from each study: (1) study characteristics (authors, year of publication, study location, research title, level of evidence, and objective); (2) main results on self-management of DM and insulin therapy.

Furthermore, the level of evidence was outlined in accordance with the recommendations of the Oxford Centre for Evidence-based Medicine. For classification of the Level of Evidence, the following were considered: 1a - systematic review of randomized controlled clinical trials; 1b - randomized controlled clinical trial with narrow confidence interval; 1c - "all or nothing" therapeutic results; 2a - systematic review of cohort studies; 2b - cohort study (including lower quality randomized clinical trial); 2c - observation of therapeutic results or ecological studies; 3a - systematic review of case-control studies; 3b - case-control study; 4 - case report (including lower quality cohort or case-control); 5 - expert opinion.

The extracted data were summarized descriptively, and the results were presented in tables and charts to illustrate the mapping of available evidence. Furthermore, a qualitative analysis of the results was carried out, particularly regarding the potential and barriers that people with diabetes have in relation to self-management of their condition and insulin therapy.

RESULTS

The initial search resulted in 726 articles. After removing 294 duplicates, 432 studies were screened by title and abstract, leading to the exclusion of 303 of them. Subsequently, 129 articles were analyzed in full, of which 92 were discarded because they did not meet the guiding question or inclusion criteria. Thus, the final sample consisted of 37 studies, as described in the flowchart (Figure 1) prepared according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) recommendations of the Equator Network.

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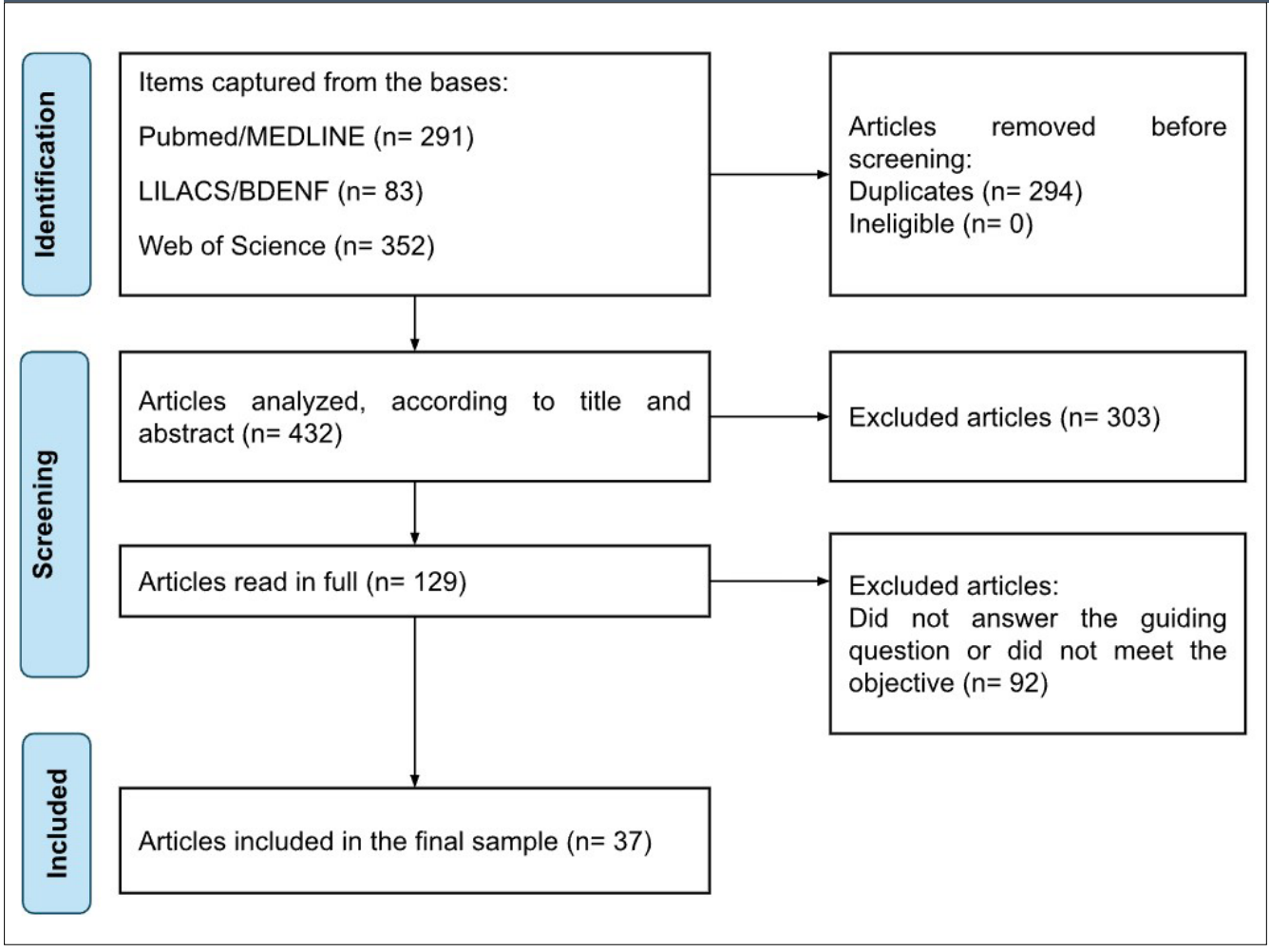
Figure 1 - PRISMA flowchart with the selection of articles that comprised the review. Floriano, Piauí, Brazil, 2024.



Source: prepared by the authors (2024).

The characterization of the included studies is presented in Table 2, detailing authors, place of performance, year of publication, level of evidence and type of methodological design.

Table 2 - Characterization of the captured works, according to the authors, year of publication, place of study, title and type of research.

N	Authors	Place of origin	Year	Title	Type of study	Level of evidence
1	O'Brien; Rooyen; Ricks.[9]	Nelson Mandela Bay, South Africa	2020	Self-management of persons living with diabetes mellitus type 2: Experiences of diabetes nurse educators.	Qualitative cross-sectional	5
2	Sayeed et al.[10]	Karachi, Pakistan	2020	Impact of Diabetes-related Self-management on Glycemic Control in Type II Diabetes Mellitus	Cross-sectional	4
3	Bezo; Lin.[11]	Honiara, Solomon Islands	2019	Factors influencing self-management behaviours among patients with type 2 diabetes mellitus in the Solomon Islands	Cross-sectional	4
4	Kumar; Mohammadnezhad.[12]	Macuata Province, Labasa, Fiji	2022	Perceptions of patients on factors affecting diabetes self-management among type 2 diabetes mellitus (T2DM) patients in Fiji: A qualitative study	Qualitative cross-sectional	5

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5	Li et al.[13]	Yangzhou, Suzhou, Jiangsu Province, China.	2022	Impact of fear of hypoglycaemia on self-management in patients with type 2 diabetes mellitus: structural equation modelling.	Cross-sectional	4
6	Kumar.; Mohammadnezhad. [14]	Macuata Province, in Labasa, Fiji.	2022	Health Care Workers' Perceptions on Factors Affecting Diabetes Self-Management Among Type 2 Diabetes Mellitus Patients in Fiji: A Qualitative Study	Qualitative cross-sectional	5
7	Korsah; Agyeman-Yeboah. [15]	Ghana	2023	Narratives of type 2 diabetes mellitus patients regarding the influence of social issues on diabetes self-management: Implications for patient care	Qualitative cross-sectional	5
8	Jiang; Jiang; Li. [16]	China	2024	The Role of Self-Efficacy Enhancement in Improving Self-Management Behavior for Type 2 Diabetes Mellitus Patients	Randomized clinical trial	1b
9	Pamungkas et al. [17]	Polewali Mandar District, West Sulawesi Province, Indonesia	2020	Barriers to Effective Diabetes Mellitus Self-Management (DMSM) Practice for Glycemic Uncontrolled Type 2 Diabetes Mellitus (T2DM): A Socio Cultural Context of Indonesian Communities in West Sulawesi	Qualitative cross-sectional	5
10	Fu et al. [18]	Taiwan	2023	Psychological insulin resistance and its impact on self-management in type II diabetes mellitus patients treated with insulin therapy	Cross-sectional	4
11	Al-Qahtani. [19]	Najran, Saudi Arabia	2020	Frequency and factors associated with inadequate self-care behaviors in patients with type 2 diabetes mellitus in Najran, Saudi Arabia	Cross-sectional	4
12	Alshahri et al.[20]	Eastern Province, Kingdom of Saudi Arabia	2020	Assessment of Self-Management Care and Glycated Hemoglobin Levels Among Type 2 Diabetes Mellitus Patients: A Cross-Sectional Study From the Kingdom of Saudi Arabia	Cross-sectional	4
13	Despins; Wakefield.[21]	United States of America	2020	Making sense of blood glucose data and self-management in individuals with type 2 diabetes mellitus: A qualitative study	Qualitative cross-sectional	5
14	Wang et al.[22]	Heilongjiang Province, China	2024	Knowledge, attitudes, and practices among patients with diabetes mellitus and hyperuricemia toward disease self-management	Cross-sectional	2c
15	Fang et al.[23]	Hunan Province, China	2020	Status of social avoidance and distress in emerging adults with Type 1 diabetes mellitus and its association with self-management and glycemic control	Cross-sectional	2c
16	Jiang et al.[24]	AnHui, China	2023	The Effect of Diabetes Management Shared Care Clinic on Glycated Hemoglobin A1c Compliance and Self-Management Abilities in Patients with Type 2 Diabetes Mellitus	Prospective Cohort Study	2b
17	Chen; Su. [25]	Taiwan	2022	Factors Related to the Continuity of Care and Self-Management of Patients with Type 2 Diabetes Mellitus: A Cross-Sectional Study in Taiwan	Cross-sectional	2c
18	Bao.[26]	China	2023	Effects of Messaging Framing on the Self-Management Activities and Self-Efficacies of Patients with Type 2 Diabetes Mellitus	Experimental	3b
19	Jafar et al.[27]	Indonesia	2023	Enhancing knowledge of Diabetes self-management and quality of life in people with Diabetes Mellitus by using Guru Diabetes Apps-based health coaching	Experimental	1b
20	Regeer et al.[28]	Netherlands	2022	Change is possible: How increased patient activation is associated with favorable changes in well-being, self-management and health outcomes among people with type 2 diabetes mellitus: A prospective longitudinal study	Longitudinal, prospective	2b
21	Patra et al.[29]	[S.L.]	2021	Prevalence of diabetes distress and its relationship with self-management in patients with type 2 diabetes mellitus	Cross-sectional	4

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22	Suplici et al.[30]	Santa Catarina, Brazil	2021	Autocuidado entre pessoas com Diabetes Mellitus e qualidade do cuidado na Atenção Básica	Cross-sectional	4
23	Kassa et al.[31]	Arsi, Ethiopia	2021	Self-care knowledge, attitude and associated factors among outpatients with diabetes mellitus in Arsi Zone, Southeast Ethiopia	Cross-sectional	4
24	Durai et al[32]	Vayalanallur, Thiruvallur district, India	2021	Self-care practices and factors influencing self-care among type 2 diabetes mellitus patients in a rural health center in South India	Cross-sectional	4
25	Luciani et al.[33]	Italy	2020	Self-care is Renouncement, Routine, and Control: The Experience of Adults with Type 2 Diabetes Mellitus	Qualitative cross-sectional	5
26	Mirzazadeh-Qashqaei et al.[34]	Iran	2023	The relationship between self-care, spiritual well-being and coping strategies in patients with type 2 diabetes mellitus	Cross-sectional	2c
27	Afaya et al.[35]	Tamale, Ghana	2023	Clinical factors influencing knowledge and self-care practice among adults with type 2 diabetes mellitus	Cross-sectional	2c
28	Gupta et al.[36]	Fatehgarh Sahib District of Punjab, India	2024	Understanding the diabetes self-care behaviour in rural areas: Perspective of patients with type 2 diabetes mellitus and healthcare professionals	Qualitative cross-sectional	4
29	Consoli; Formoso.[37]	Italy	2023	Patient perceptions of insulin therapy in diabetes self-management with insulin injection devices	Cross-sectional	5
30	Lin et al.[38]	China	2020	Utilizing Technology-Enabled Intervention to Improve Blood Glucose Self-Management Outcome in Type 2 Diabetic Patients Initiated on Insulin Therapy: A Retrospective Real-World Study	Longitudinal, prospective	2b
31	Liang et al.[39]	Shanghai, China	2023	Perception of self-management and glycaemic control in people with type 2 diabetes receiving insulin injection therapy: A qualitative study	Qualitative cross-sectional	4
32	Deger et al.[40]	Eldivan, Çankırı, Turkey	2024	Effect of Insulin Pen Training Using the Teach-Back Method on Diabetes Self-Management, Quality of Life, and HbA1c Levels in Older Patients with Type 2 Diabetes: A Quasi-Experimental Study	Quasi-experimental	2b
33	Lemos et al.[41]	Brazil	2024	Demandas de aprendizado da autogestão do diabetes: estudo qualitativo com pessoas que utilizam a insulina	Qualitative cross-sectional	5
34	Santos et al.[42]	Brazil	2022	Fatores relacionados a complicações teciduais decorrentes da insulinoterapia: estudo transversal	Cross-sectional	2b
35	Cunha et al.[43]	Fortaleza, Ceará, Brazil	2020	Prática insulinoterápica realizada por pessoas com diabetes na Atenção Primária em Saúde	Cross-sectional	4
36	Persson et al.[44]	Östergötland County, Sweden	2022	'Striving for freedom or remaining with what is well-known': a focus-group study of self-management among people with type 1 diabetes who have suboptimal glycaemic control despite continuous subcutaneous insulin infusion	Qualitative cross-sectional	5
37	Reis et al.[45]	Rio Grande do Sul, Brazil	2020	Autocuidado e percepção do tratamento para o diabetes por pessoas em uso de insulina	Qualitative cross-sectional	5

Source: prepared by the authors (2024).

Table 3 summarizes the objectives and main findings of the included studies. The factors that influence self-management of DM were widely discussed, including barriers and facilitators for adequate management of the disease and insulin therapy. Aspects such as knowledge about the condition, social support, influence of the health team and coping strategies were frequently mentioned as determinants of self-management.

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Table 3 - Characterization of studies according to objective and main results.

N	Objective	Main results
1	To describe the experiences of diabetes nurse educators regarding T2DM self-management of people living with T2DM.	Nurses had clear perceptions about the importance of patient education for self-management of DM2, motivation and empowerment, as well as the factors that affect self-management, and identified ways to help people living with DM2 in self-management of their condition.
2	To assess the impact of diabetes self-management activities and behaviours on glycaemic control in people with diabetes.	The effectiveness of self-management is related to socioeconomic factors, employment, age, marital status, duration of the disease and the therapy used. Men have worse glycemic control, as do married people, those over 60 years of age, those with primary to secondary education, those who work in an office, those with 5 to 10 years of DM duration and those who are treated with oral hypoglycemic agents.
3	To explore the current status of self-management behaviours among people with type 2 diabetes mellitus in the Solomon Islands and discuss the factors influencing these behaviours.	Patient knowledge and perception were the main factors that interfere with DM self-management. In addition, smoking and physical activity had statistically significant negative impacts on self-management and/or its dimensions.
4	To explore patients' perceptions of factors affecting diabetes self-management among patients with Type 2 Diabetes Mellitus (T2DM) from Labasa, Fiji.	Participants had little knowledge about diabetes, and as a result, they demonstrated poor attitudes towards preventing its complications. Self-management practices among patients were insufficient; 50% of patients believed that drug treatment did more harm than good; most patients lacked social support from their children; physical activity was challenging; most patients had financial difficulties; social programs made it difficult to follow a healthy diet; some patients replaced drug treatment with herbal medicine. However, most practiced self-management of diabetes by reducing sugar and sweet intake, quitting smoking, reducing alcohol consumption, changing their diet and exercising daily.
5	To explore the effect of fear of hypoglycaemia on self-management and its specific pathway of action in patients with T2DM to provide a basis for the development of targeted nursing interventions.	Fear of hypoglycemia is associated with anxiety, suffering, self-esteem and social support, and recognizing and identifying symptoms is a challenge for people with diabetes. The results showed that 43% of participants had hypoglycemia more than 3 times in a 6-month period and most had HbA1c greater than 7%.
6	To explore healthcare professionals' perceptions of factors affecting diabetes self-management among Fijian patients with T2DM.	The services had good care support and guidance from the multidisciplinary team; poor family support, financial constraints, lack of resources and strong cultural beliefs affect adherence to inadequate DM self-management practices.
7	To explore the perspectives of individuals living with T2DM on the influence of social factors on diabetes self-management in the Ghanaian context.	Social stigma was an implication present for participants that affected DM self-management. This stigma was experienced through changes in appearance; decreased social interactions; reluctance to disclose the diagnosis; fear; anxiety; stress and apprehension among patients. These experiences triggered the need to resort to alcohol consumption to deal with feelings.
8	To analyze the mechanism of behavioral variations in self-management in patients with type 2 diabetes mellitus who underwent a structured educational program focusing on self-efficacy.	The structured educational program focused on self-efficacy contributed to the improvement of self-management behaviors in 3 months, through the reduction of suffering, as well as with the increase in encouragement and motivation of patients to improve their behaviors. However, it is necessary that this education be carried out constantly, since the effects do not last for a long time.
9	To explore the barriers to effective practice of DM self-management among patients with uncontrolled glycemic type 2 diabetes mellitus (T2DM) in Indonesia.	Patients have little awareness of DM disease; inadequate knowledge and self-management skills; lack of motivation; insufficient human resources; lack of social engagement; and feel socially excluded and embarrassed.
10	To assess patients' levels of psychological insulin resistance and identify factors associated with self-management in patients with type 2 diabetes mellitus treated with insulin therapy.	Positive self-management is related to self-application of insulin, fewer expectations regarding its use, no complications of diabetes, less fear of injection and self-testing, no hypoglycemia in the previous year, and younger age.

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11	To investigate the frequency and factors associated with inappropriate self-management behaviors in patients with type 2 diabetes mellitus (T2DM).	The results showed that 90.1% of the patients had inappropriate behaviors, of which 86.5% were related to dietary control and 78.3% to physical activity. In addition, there was a positive correlation between glucose control and dietary control (r = 0.304); between dietary control and health care (r = 0.206); and between physical activity and the total score on the Diabetes Self-Management Questionnaire (r = 0.533; p < 0.001).
12	To explore the relationship between patient characteristics, self-management, and glycated hemoglobin (HbA1c) levels, as an indicator of optimal glycemic control.	It was evident that 80% of the participants were obese or overweight, and only 13.5% had a Body Mass Index (BMI) within normal parameters; the majority had hypertension and/or dyslipidemia; 65% had poor glycemic control with HbA1c ≥ 7%.; lower education and income negatively influenced adherence to physical activity; having a good BMI was related to physical activity
13	To describe the interpretation of blood glucose data and other influences that impact self-management behavior by individuals with type 2 diabetes mellitus.	Participants classified glucose levels based on their experiences; they learned about diabetes in classes, experience, health information technologies and on social networks. In addition, strategies such as, for example, reducing carbohydrates or replacing them with other types and using a glucometer to assess blood glucose levels to make dietary changes were widely used in self-management of DM; social events were barriers to following a good diet.
14	To assess knowledge, attitudes, and practices (KAP) among patients with diabetes mellitus and hyperuricemia regarding self-management of the disease.	Patients presented insufficient knowledge, active attitudes and unsatisfactory practices regarding self-management. Furthermore, 82.78% understood that management could improve their condition and 77.59% considered it very important to implement this practice, however only 58.09% were willing to learn about self-management, and 51.24% had never participated in exercises to improve DM. Concern and anxiety related to possible complications of DM were feelings reported by almost half of the participants (49.38%).
15	To understand the current state of avoidance and social distress in adult patients with T1DM in the early stages of onset and explore the correlation between avoidance.	Avoidance and social distress in people with DM1 were greater than in healthy people, these are factors that reduce communication with the health team and participation in activities to manage the condition, resulting in lower levels of self-management, the greater the levels of avoidance and social distress, the greater the amount of HbA1c in the blood.
16	To evaluate the impact of clinic shared care for diabetes management on adherence to glycated hemoglobin and self-management skills in patients with type 2 diabetes mellitus (T2DM)..	The guidance provided by professionals at the shared care clinic led to significant improvements for patients in terms of physical activity, blood glucose testing, administering medications correctly, and reducing smoking; other care measures, such as following a healthy eating plan and foot care, did not yield significant results.
17	To explore the relationship between continued care and self-management of patients with Type 2 Diabetes Mellitus (T2DM) and analyze the predictive factors affecting their self-management.	The results demonstrated that in the relationship between continued care and self-management, the problem-solving category obtained the highest score and blood glucose monitoring the lowest; older people have worse communication with the health team, self-integration and self-monitoring of blood glucose; married patients have better self-management; patients without religious beliefs have better communication with professionals; patients with higher educational level, socioeconomic conditions, employees and who practice exercise 1-2 times a week have better self-management results; patients with complications have better performance in problem-solving; self-monitoring of blood glucose is higher in patients with HbA1c <7.
18	To investigate the impacts of positive and negative message framing interventions on self-management activities and self-efficacy of patients with type 2 diabetes mellitus (T2DM).	Framing positive and negative messages demonstrated significant improvements in self-management behaviors, especially regarding diet, blood glucose testing, foot care, and taking medications, especially negative messages with threatening messages.
19	To identify the effect of Android App-Based Health Coaching on glycemic hemoglobin level, knowledge and quality of life in people with T2DM.	After analyzing the results, it was found that the intervention contributed to improving patients' knowledge about self-management and quality of life, but did not show significant results in reducing HbA1c.
20	To examine the relationship between risk factors for low patient activation and changes in patient activation, well-being, and health outcomes in people with type 2 diabetes mellitus (T2DM).	Patient activation increased significantly and was associated with an increase in emotional well-being, exercise behavior, general dietary behavior, and a reduction in BMI.

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21	To estimate the prevalence of diabetes distress and identify its sociodemographic and clinical determinants in patients with type 2 diabetes mellitus and to assess the relationship of diabetes distress with self-management in non-depressed type 2 diabetes mellitus.	The prevalence of diabetes distress was 42%; diabetes duration showed a significant association with diabetes distress; Diabetes distress was significantly and negatively associated with all four self-management domains, while statistical significance was reached in three domains: dietary control (- = −0.378, P < 0.01); glucose management (- = −0.181, P < 0.01); and healthcare use (- = −0.244, P < 0.01).
22	To assess adherence to self-care activities among people with diabetes mellitus and its association with the quality of care received in Primary Care.	Continuous PHC work contributes to adherence to a healthy diet, glycemic monitoring, and medication use.
23	To assess self-care knowledge, attitude and associated factors among outpatients with diabetes mellitus in Arsi Zone, South-Eastern Ethiopia.	The results demonstrated that marital status, occupation, and socioeconomic status significantly affected knowledge about DM self-management.
24	To find the various self-care practices of patients with type 2 diabetes undergoing treatment in a rural health center of a medical college and the factors influencing self-care.	According to the survey, 25.5% of patients adhered to at least four dietary changes; 46% were physically active; 57% had good adherence to medications; prevention of hypoglycemia ranged from 21% to 51%; 90% avoided walking barefoot; wheat- or millet-based foods are the most consumed daily; fruit intake is very low and more than 76% stop eating roots and tubers; after diagnosis, more than 69.2% stopped smoking, 64.3% stopped drinking and 29.4% stopped using tobacco.
25	To explore the experience and meaning of self-care maintenance, self-care monitoring and self-care management in adults with T2DM.	From the perspective of some patients, self-management of care can be perceived as renunciation, routine and a form of control.
26	To investigate the relationship between self-care activities with coping strategies and spiritual well-being (SWB) in patients with type 2 diabetes mellitus (T2DM).	Religious activities have a significant relationship with better care behaviors, through mechanisms that positively impact the physical and mental coping of people with diabetes.
27	To determine the clinical factors associated with self-care knowledge and practice among adults living with T2DM.	It was shown that the longer the patient attended the clinic, the higher the level of knowledge about the condition; patients using combined insulin and oral hypoglycemic agents have superior knowledge about self-management than those on monotherapy.
28	To explore the perspectives of T2DM patients and healthcare professionals on diabetes self-care.	Self-management behavior in people with DM is limited by lack of understanding of the condition, beliefs, side effects of treatment, attitudes, comorbidities, family support, socioeconomic and climatic factors; limitations in professional training and scarcity of resources make it difficult to provide patient-centered care; patients understand the need for educational interventions to improve their self-management behaviors.
29	To understand the satisfaction levels and unmet needs of patients with diabetes regarding daily insulin therapy, to investigate the possibility of new insulin pen functions and methods that may improve adherence, and to explore the potential of connected-enabled insulin pens compared to standard insulin pens.	The cognitive load imposed by the need to manage their condition and the excess of information received are barriers present for people with DM using insulin.
30	To evaluate the benefits of a mobile application through the Lilly Connected Care Program (LCCP) in achieving blood glucose control and adherence to self-monitoring of blood glucose in patients with type 2 diabetes mellitus (T2DM).	The application of the intervention resulted in a significant reduction in hypoglycemia and improved glycemic control of patients.

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31	To explore the experience of self-management and glycemic control in Chinese individuals with type 2 diabetes receiving insulin injection therapy.	People on insulin therapy experience a series of challenges in self-management of their care, which make glycemic control difficult. However, understanding the need for more information, seeking help and trusting professionals are potential ways to improve self-management.
32	To determine the effect of insulin pen training using the Teach-Back method in elderly patients with type 2 diabetes on their self-management of insulin treatment, quality of life (QoL) and glycated hemoglobin (HbA1c) levels.	A significant difference was found in the mean scores on the scale between the intervention group and the control group after training. The mean self-management of insulin treatment and the quality of life scale scores of the intervention group were significantly higher than those of the control group after training. Post-training HbA1c levels in the intervention group were lower than pre-training levels.
33	To understand the experiences with diabetes mellitus management of people using insulin, to identify possible factors that may influence adherence to self-care and, thus, define their learning demands for diabetes self-management.	Carbohydrate counting, self-monitoring and insulin correction are strategies used by some patients to make food choices more flexible and reduce the emotional burden of living with DM. On the other hand, the number of tests performed routinely and the injuries caused to the fingers are seen as disadvantages, but these are outweighed by the prevention of complications. Furthermore, adapting to the applications, finding an insulin that best suits your body, defining the correct dose for application, the social stigma attached to the use of syringes and the fear of needles are difficulties associated with insulin therapy, as well as the lack of professional guidance.
34	To identify the factors related to the occurrence of tissue complications resulting from insulin therapy.	Most participants (73.5%) had local complications and did not rotate injection sites (82.3%).
35	To analyze insulin therapy performed by people with diabetes in Primary Health Care.	Most participants had type 2 diabetes (62.0%) with complications (42.7%), and were using oral hypoglycemic agents and insulin. Syringes/needles (83.1%), lancets (85.5%), reagent strips (91.0%) and insulin vials (93.8%) were stored incorrectly by the majority. The correct method predominated in preparation, application and transportation. Waste was discarded incorrectly. In insulin therapy, the majority performed it inappropriately (93.3%).
36	To explore the attitudes and experiences of self-management among people with T1DM and suboptimal glycemic control despite treatment with continuous subcutaneous insulin infusion.	Some patients with DM1 undergoing treatment with Continuous Subcutaneous Insulin Infusion may associate the strategy as a method that promotes flexibility and freedom in their daily lives, while others still have ingrained thoughts and prefer to use multiple daily insulin injections, despite the discomfort generated, since they feel safer in maintaining habits and regimens that are already well known to them.
37	To understand the perception of people with DM using insulin about their self-care and the impact of treatment on their daily lives.	Three categories emerged that address the difficulties in changing lifestyle habits for patients: The (im)possible change in lifestyle, the repercussions of insulin use in daily life and access to pharmaceutical supplies.

Source: prepared by the authors (2024).

Table 4 presents the main factors that affect self-management of DM. Among them, professional support, socioeconomic and clinical factors, interpersonal support and the level of functional health literacy stand out. In addition, psychological and social aspects also play a relevant role in adherence to treatment, and may influence the adoption of healthy behaviors.

Table 4 - Main factors that influence DM self-management.

N	Factors that influence DM self-management.
1, 16, 17, 20, 22, 27, 28	Professional support.
2, 3, 4, 6, 12, 17, 23, 28	Socioeconomic factors (employment, age, marital status and education), clinical factors (duration of illness, presence of comorbidities and therapy used), interpersonal factors (culture and family support).
4, 5, 9, 14, 28	Deficiency in functional health literacy.
7, 10, 15, 21, 25, 26	Psychological and social factors.
8, 13, 28	Health education.
11, 24	Inappropriate behaviors.
18, 19	Use of digital technologies.

Source: prepared by the authors (2024).

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Insulin therapy self-management, specifically, is influenced by different factors, as shown in Table 5. Inadequate knowledge about the insulin application technique, incorrect storage, cognitive load associated with managing the condition, and difficulty in modifying behaviors were identified barriers. The use of digital technologies and health education emerged as promising strategies to improve treatment adherence and efficacy.

Table 5 - Main factors influencing self-management of insulin therapy.

No.	Factors that influence self-management of insulin therapy
29	Cognitive load in managing the condition.
30	Use of digital technologies.
31	Professional support.
32	Health education.
33,34,35	Little knowledge about handling and application technique of insulin.
36	Deficiency in functional health literacy.
37	Difficulty in changing behaviors.

Source: prepared by the authors (2024).

DISCUSSION

In this review, a significant number of studies on the subject were found. However, most of them focus on foreign literature, and, despite the relevance of the topic, it is still little explored in Brazil. In addition, the articles analyzed predominantly address factors associated with DM, while few specifically discuss self-management of insulin therapy.

Given the high prevalence and morbidity and mortality of DM, the adoption of adequate self-management practices and adequate knowledge about the disease are fundamental for effective glycemic control and the prevention of complications. In this review, it was identified that socioeconomic, clinical and interpersonal factors play a central role in the self-management of DM.

A study conducted in Nigeria showed that only 1.3% of the study participants correctly understood the concept of diabetes, while 87% were unaware of the importance of regular blood glucose monitoring and only 33.6% understood what it meant to have a balanced diet. Furthermore, the level of Knowledge, Attitudes and Practices (KAP) was higher in people who received health education, had employment and had better socioeconomic status. [46] These findings reinforce the relationship between access to education, financial stability and adherence to appropriate self-management practices.

Providing educational activities is essential for treatment, given that many patients are unaware of the consequences of inadequate glycemic control. In addition, it encourages patients to define their goals and gives them control over their choices. [9]

Nurses have excelled in providing confidence and knowledge through health education, promoting patients' understanding of important aspects for health management, assisting in the health literacy process and qualifying the care provided by professionals [9] The health education process is essential for patients to achieve self-management and become the main agent of change in their behavior.

Self-management can also be influenced by marital status. Married people have more family support than single individuals, a factor that has a positive impact on adherence to medication treatment and self-care, given that the presence of a partner helps to overcome problems associated with the disease that could be more difficult to deal with without someone's support. [12]

Negative attitudes towards the condition are worrying aspects that can have an impact on adherence to treatment and behaviors that provide a better quality of life. The cognitive burden of managing the condition is a negative factor in relation to self-management of DM, being associated with the social stigmas experienced, physical changes caused by treatment, difficulty in abandoning old habits and meeting treatment goals, which can impact patients' psychological well-being. [15]

Furthermore, feelings such as nervousness, anxiety, irritability, depression, tiredness/fatigue, pessimism, low availability to socialize with friends, collaborate with family and work capacity are less present in people who are unaware of the DM diagnosis. [47] In this sense, in addition to clinical aspects, attention must be paid to the emotional stress that accompanies the diagnosis, considering the impacts

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generated on the individual's psychosocial activities.

Interdisciplinary support is essential for the quality of life of people with DM, however, there are gaps in psychological and emotional care that can hinder the continuation of treatment. A survey conducted with psychologists demonstrated difficulties faced in professional practice, among them are poor adherence to diabetes treatment, resistance to psychological treatment, insufficient training to work with this population and lack of access to supplies, rights and public policies aimed at mental health in the public network. [10]

In addition to psychosocial aspects, age also influences diabetes self-care; people over 60 are more prone to poor glycemic control. [10] A study conducted with patients with DM2 in the state of Maranhão, Brazil, corroborates this, given that 53.33% of participants were not aware of self-care practices, the majority of whom were elderly people with low socioeconomic and educational levels. In addition, 75% did not perform physical activity and 53.33% did not perform self-assessment of their feet. [48] These findings suggest that social vulnerability and low access to information may negatively impact disease management in this population.

Understanding important aspects of DM is one of the main aspects that can influence self-management of the condition, and is a problem that should receive attention from health professionals, especially those in Primary Health Care, which is the gateway to the Unified Health System for preventing health problems in the population.

Patients' perception of diabetes is often limited to a condition related to excess blood sugar, especially among older people. However, they recognize the need to change their habits and follow the advice of their professionals. [12]

Regarding the factors that interfere with self-management of insulin therapy, a cross-sectional study conducted in Fortaleza, Ceará, Brazil, showed that the majority had been diagnosed with DM and had some complication for 10 to 19 years. Regarding the storage of supplies, 83.1% of those who used syringes stored them after use to reuse them. In addition, the strips and lancets were also stored incorrectly, as well as the insulin bottles, which were stored in the refrigerator door. [49]

Reusing syringes is not a recommended practice as it can interfere with the action of insulin and cause skin lesions in patients. [7] However, it is a common practice among people who receive insulin, this may be associated with the high cost of acquiring supplies and also the lack of knowledge about the condition.

Furthermore, a recently published scoping review highlighted 12 difficulties encountered by patients with DM2 in self-administration of insulin, the main ones being pain during application, knowledge of the correct dose and adjustment according to capillary blood glucose, lack of knowledge about the application technique, presence of some functional alteration (visual deficit, tremors, joint immobility, cognitive deficit) and fear. [49]

It is clear that people with diabetes still face many difficulties, whether clinical, psychosocial or technical. Health professionals must be careful to resolve these difficulties and improve the quality of life of patients and healthcare.

The lack of knowledge about DM is a factor that interferes with all others, as it makes it difficult to carry out essential practices for good glycemic control and prevention of complications. In this sense, health education is an essential tool to provide patients with autonomy in managing their condition. To do this, it is necessary to strengthen the bond with the patient, so that they feel welcome to share their difficulties and adhere to the recommendations requested. [9] This way, patients can make assertive decisions to ensure effective self-care and quality of life.

The reviewed articles demonstrate that despite being a condition with high morbidity and mortality worldwide, there are still factors that directly influence the self-management of DM and its treatments, mainly socioeconomic factors that a priori hinder the acquisition of indispensable knowledge to achieve quality of life and autonomy in the management of the condition. Demonstrating the need to improve the professional-patient bond so that shared decisions can be made and the patient is updated with appropriate health education strategies according to their individualities.

CONCLUSION

This study reviewed the main factors that influence self-management of DM and insulin therapy, highlighting barriers and facilitators in the management of the condition. The findings demonstrated that socioeconomic, clinical, interpersonal, psychological and educational aspects directly impact adherence to treatment and the ability of patients to manage their own health.

Professional support, health education and the use of digital technologies were identified as fundamental strategies to strengthen self-management. However, challenges such as low education level, financial difficulties, social stigmatization and emotional barriers still compromise adherence to treatment. In the case of insulin therapy, difficulties in the application technique, inadequate storage and psychological resistance to the use of insulin reinforce the need for specific interventions to ensure safe and effective management.

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