

## Prevention Of Diabetic Foot: Educational Interventions For Patients With Diabetes Mellitus

Cícera Rejane Tavares De Oliveira<sup>1</sup>, Wilma Kátia Trigueiro Bezerra<sup>2</sup>,  
Samuel Ilo Fernandes De Amorim<sup>3</sup>, Mayle Alves Bezerra<sup>4</sup>,  
Francisca Sabrina Vieira Lins<sup>5</sup>, Iago Da Silva Barbosa<sup>6</sup>,  
Kylvia Luciana Pereira Costa<sup>7</sup>, Georgy Xavier De Lima Souza<sup>8</sup>,  
Denys Ferreira Leandro<sup>9</sup>, Francisca Simone Lopes Da Silva Leite<sup>10</sup>,  
Ivonete Aparecida Alves Sampaio<sup>11</sup>, Maria Alanna Carvalho Lima<sup>12</sup>,  
Luma Alexandre Vieira<sup>13</sup>, Paula Viviany Jales Dantas<sup>14</sup>

<sup>1</sup>(Universidade Regional do Cariri – URCA)

<sup>2</sup>(Universidade Federal de Campina Grande - UFCG)

<sup>3</sup>(Centro Universitário Estácio do Ceará – IDOMED)

<sup>4</sup>(Centro Universitário Estácio do Ceará – IDOMED)

<sup>5</sup>(Centro Universitário Santa Maria - UNIFSM)

<sup>6</sup>(Universidade Federal do Triângulo Mineiro – UFTM)

<sup>7</sup>(Universidade Federal de Campina Grande - UFCG)

<sup>8</sup>(Centro Universitário Estácio do Ceará – IDOMED)

<sup>9</sup>(Centro Universitário Santa Maria - UNIFSM)

<sup>10</sup>(Centro Universitário Santa Maria - UNIFSM)

<sup>11</sup>(Universidade Estadual do Ceará – UECE)

<sup>12</sup>(Faculdade Integradas do Ceará - UNIFIC)

<sup>13</sup>(Instituto Federal de Educação, Ciência e Tecnologia do Ceará – IFCE)

<sup>14</sup>(Universidade Federal de Campina Grande - UFCG)

---

### Abstract:

This article aims to conduct a literature review on the main educational interventions for preventing diabetic foot in patients with Diabetes Mellitus (DM), analyzing self-care strategies, the effectiveness of approaches, and their impact on reducing complications such as ulcers and amputations. The methodology involved systematic searches in electronic databases, including PubMed, Scopus, and Web of Science, using terms related to the topic, such as "health education," "diabetes mellitus," and "diabetic foot." Original articles, systematic reviews, and meta-analyses addressing health education and self-care in diabetic patients were included. The data were critically extracted and analyzed to identify best practices and gaps in the existing literature. The results highlighted educational strategies such as pamphlet programs, follow-up consultations, educational videos, motivational interviews, workshops, text messaging (SMS), educational groups, and booklets, among others. These strategies proved effective in promoting self-care and reducing complications associated with diabetic foot. Health education emerged as a central element, enabling patient empowerment, fostering autonomy, and facilitating informed decision-making regarding necessary care. In conclusion, the prevention of diabetic foot relies on well-planned, accessible, and diverse educational approaches.

**Keywords:** Health Education. Prevention of Diabetic Foot. Self-Care.

---

Date of Submission: 06-01-2025

Date of Acceptance: 16-01-2025

---

### I. Introduction

Diabetes Mellitus (DM) is recognized as one of the most prevalent and challenging chronic health conditions faced by contemporary society. With a steady increase in its global incidence, diabetes not only represents a public health challenge but also a growing concern in social, economic, and academic terms.

Malta (2017) and Marinho, Passos, and França (2016) reveal that DM is the fourth most common health condition, ranking behind cardiovascular diseases, neoplasms, and respiratory diseases. It is estimated that around 425 million people worldwide are affected by this condition, with its prevalence increasing at an alarming rate.

Diabetes mellitus affects approximately 425 million people globally. In Latin America, particularly in Brazil, the impact of diabetes is especially significant. With approximately 12.5 million individuals affected—most of them women living in urban areas—Brazil ranks among the countries with the highest number of diabetes cases worldwide. Additionally, the country faces the highest diabetes mortality rates in the South and Central American regions (Souza et al., 2021; Teston et al., 2018).

The consequences of elevated blood glucose levels are severe, potentially causing nerve damage throughout the body, affecting autonomic, motor, and sensory functions. This condition can lead to serious complications such as ulcers, infections, and amputations, contributing to the high incidence of diabetes-related lower limb amputations every 30 seconds worldwide (Carvalho, 2019; Oliveira, Montenegro Jr., Vencio, 2017).

These complications not only negatively impact the quality of life and survival of affected individuals but also impose a substantial burden on healthcare systems and families (Lima; Menezes; Peixoto, 2018).

In light of this challenging scenario, health education targeted at diabetic patients emerges as a key strategy for promoting self-care and improving the quality of life of these individuals. Through cognitive-behavioral strategies and health education programs, the aim is to empower patients to effectively manage their condition and prevent complications.

Ulcers are the most significant and frequent complication associated with diabetic foot syndrome. The earlier and more appropriate the treatment of the lesion, the greater the chances of healing and the lower the risk of amputation of the affected limb (Vedolin et al., 2003). According to Duarte and Gonçalves (2011), the risk of developing wounds is so substantial that every 30 seconds, a lower limb amputation occurs.

Individuals at high risk for ulceration can be easily identified through a careful clinical examination of their feet, coupled with proper hygiene, appropriate footwear, and patient awareness (Duarte; Gonçalves, 2011). However, according to the Brazilian Diabetes Society (2009), studies have shown that only 58% of cases included foot examinations recorded in a multicentric sample of primary and hospital care.

Leite (2010) describes the diabetic foot as the result of multiple pathological processes involving all components of the lower limb, including the skin, subcutaneous tissue, muscles, bones, joints, vascular structures, and nerves. Thus, understanding these processes is essential for developing and implementing preventive strategies.

According to Bortoleto (2009), diabetic foot accounts for 50% to 70% of non-traumatic lower limb amputations and is 15 times more frequent among diabetics. It is responsible for 50% of hospital admissions and is considered the leading cause of lower extremity amputations, often requiring prolonged hospital stays and costly treatments. These complications have profound social and psychological repercussions for patients, significantly affecting their quality of life and that of their families.

To reduce injuries and prevent lower limb amputations, it is crucial to distinguish between neuropathic and ischemic feet, thereby addressing specific needs. This approach was implemented following the establishment of the multidisciplinary diabetic foot clinic at Santo Antônio General Hospital (HGSA) in 1987 (Horta et al., 2003).

According to the National Policy outlined by the Brazilian Unified Health System (SUS), individuals with diabetes must have their feet regularly examined at the Family Health Unit (USF) in their area as needed. This is carried out through the Hypertension and Diabetes Program (HIPERDIA), which aims to ensure access to prescribed medications and provide comprehensive care (Brasil, 2009).

In this context, the present article aims to conduct a literature review on the main educational interventions aimed at preventing diabetic foot in patients with Diabetes Mellitus, analyzing self-care strategies, the effectiveness of these approaches, and their impact on reducing complications such as ulcers and amputations.

## **II. Materials And Methods**

The methodology adopted for this review consisted of searches in electronic databases such as PubMed, Scopus, and Web of Science, using search terms relevant to the topic, such as "health education," "diabetes mellitus," "diabetic foot," among others.

Original articles, systematic reviews, and meta-analyses addressing health education and the promotion of self-care in diabetic patients were included. The selection of studies followed pre-established inclusion and exclusion criteria.

Relevant data were extracted and synthesized to enable a comprehensive and critical analysis of the information available in the literature.

The results were presented clearly and systematically, highlighting the main findings and identifying gaps in the current knowledge.

### **III. Results And Discussions**

Health promotion is an essential element that has been widely recognized as an integral part of the activities carried out by Primary Care teams. Over time, the understanding and approach to health education have evolved, shaped by different historical and political contexts (Brasil, 2017).

In the late 19th century, health education emerged as an authoritarian and normative strategy, employing coercive methods and blaming the population for diseases resulting from poor hygiene. Later, in the mid-20th century, health education adopted a more positivist approach, centered on the biological model, aiming to inform the population about the norms of physical, mental, and social well-being, thereby encouraging individual responsibility for health (Reis et al., 2013).

From the 1960s and 1970s, with Brazil's healthcare reform movement, health education shifted to include discussions about the social determinants of health and Paulo Freire's principles of popular education. This approach emphasized problematizing reality and seeking solutions to transform health conditions, moving beyond the mere transmission of information (Reis et al., 2013; Freire, 1978).

Thus, it is essential to recognize the diverse approaches to health education when conceptualizing it. Traditionally, it has been viewed as a field of public health aimed at promoting health and preventing diseases. Furthermore, it is often perceived as merely transmitting knowledge, described by Paulo Freire as "banking education," where individuals are treated as passive recipients of information without room for contextualization or critical reflection. Therefore, it is crucial for the population to understand health education as an ally in understanding, preventing, and overcoming diseases (Freire, 1978; Gomes; Merhy, 2011).

As an integral part of the care provided to the community, health education is incorporated into various public policies, ensuring its recognition and inclusion as an essential health service, as stipulated by law (Campos, 2013).

Education, by empowering patients to manage their own condition, promotes self-management and autonomy in decision-making about self-care. This results in greater patient collaboration in their health care, contributing to improved clinical outcomes, health conditions, and survival (Ciryno et al., 2009; Funnell et al., 2008; Jarvis et al., 2010).

In the context of diabetes, empowering individuals with knowledge about their condition has become crucial for the success of treatment and the prevention of complications. Some studies show that among individuals with DM, a significant proportion lacks knowledge and self-care skills, resulting in poor glycemic control for many patients (Norris et al., 2002; Otero; Zanetti; Ogrizio, 2008; Brazilian Diabetes Society, 2009).

From this perspective, it can be affirmed that empowering individuals with knowledge about the disease directly influences treatment adherence, glycemic control, and the prevention of complications (Cruz; Melo; Barbosa, 2011).

Health education should stimulate diabetic patients' ability to critically analyze and construct knowledge through meaningful learning. Despite many educational activities being conducted in health services, few significant results are observed (Leite; Prado; Peres, 2010).

In this context, this review allowed the identification of different educational strategies for preventing foot ulcers in people with Diabetes Mellitus (DM). These strategies include health education, educational programs with pamphlets, follow-up consultations, PowerPoint presentations, informational leaflets, diabetic foot exams combined with self-care guidance, motivational interviews, educational videos, educational interventions, workshops, text messaging (SMS), educational groups, individualized education, and educational booklets.

Health education activities are widely used to popularize and facilitate access to care, prevention, and treatment of diseases. These activities are essential for promoting self-care and raising awareness among DM patients about the importance of adhering to care practices, providing them with the knowledge necessary to prevent complications such as foot ulcers (Andrade et al., 2019; Silva et al., 2017).

Health education can be conducted individually, either during nursing consultations or home visits. This approach allows closer interaction with the patient and their family, helping them understand the disease and the necessary care to avoid complications (Mendes et al., 2008; Galdino et al., 2019).

This strategy contributes to the development of patient autonomy and self-care, assisting in understanding the advantages of making assertive decisions about treatment and appropriate ways to prevent complications such as ulcers (Liu et al., 2019).

Educational programs with pamphlets were also identified as effective methods for preventing ulcers. Such programs combine activities designed to empower patients in self-care, resulting in clinical improvements and better quality of life, as described by Despaigne et al. (2015) and Nguyen et al. (2019). Educational pamphlets, which present written and visual information in an attractive manner, play an important role in raising awareness and encouraging individual foot care practices (Sekhar et al., 2017; Sharoni et al., 2017).

Continuous follow-up consultations are another highlighted strategy in educational programs. This method allows for a longitudinal assessment of patients' conditions, enabling timely interventions and guidance on foot care (Liu et al. 2019; Mendes et al. 2008).

The use of PowerPoint as a didactic tool was also mentioned in some studies. This resource aids in presenting content visually, verbally, and in writing, facilitating understanding of foot ulcer prevention (Sharoni et al., 2017; Morris, 2019).

The clinical examination of the feet in people with DM, combined with health education guidance, is a simple, accessible, and effective approach for the early identification of dermatological and motor changes (Silva et al. 2017; Andrade et al. 2019).

Another highlighted method was motivational interviewing, which aims to increase patients' motivation to adopt lifestyle changes and improve treatment adherence. Studies indicate that this approach is effective in preventing DM-related complications (Keukenkamp et al., 2018; Şen et al., 2015).

Educational videos, combining visual, auditory, and textual elements, have proven to be attractive and practical tools for promoting knowledge about foot care (Abrar et al. 2020).

Workshops and educational activities are interactive and practical strategies that facilitate learning through experience and participatory learning. These activities help patients better understand the prevention and treatment of ulcers (Schoen et al. 2016; Silva et al. 2016).

The use of mobile technologies, such as text messaging (SMS), is another relevant practice. This tool enables the dissemination of information in an accessible and low-cost manner, as described by Moradi et al. (2019) and Bodicoat et al. (2015).

Educational groups were also identified as an effective strategy to promote behavioral changes and encourage self-care, creating a space for experience sharing and mutual support among participants (Nass et al., 2019; Jarvis et al., 2010).

Educational booklets, in turn, stand out for using written language and visual images to communicate information clearly and accessibly. This material helps raise patient awareness and develop self-care skills (Galdino et al., 2019; Sekhar et al., 2017).

Therefore, adopting different educational strategies by health professionals is essential for preventing foot ulcers in people with DM. Despite the limitations of this study, such as the exclusion of articles not freely available, the presented data offer relevant contributions, especially for Primary Care professionals, where educational practices play a central role in caring for DM patients.

#### **IV. Conclusion**

The prevention of diabetic foot is an essential component in the management of Diabetes Mellitus, given the high prevalence and severe complications associated with this condition. This review identified various educational strategies, such as programs with pamphlets, follow-up consultations, educational videos, motivational interviews, workshops, text messaging (SMS), educational groups, booklets, among others, which have proven effective in promoting self-care and reducing complications such as ulcers and amputations.

Health education activities are fundamental for empowering patients to manage their condition, fostering autonomy and self-care. Well-planned and implemented educational strategies can significantly improve patients' quality of life and help reduce costs associated with the treatment of severe complications.

Despite the study's limitations, such as the exclusion of articles not freely available, the findings presented offer important contributions, especially for Primary Care professionals who play a central role in implementing educational practices for patients with DM. Further research is essential to explore and develop strategies that are increasingly accessible and effective, considering the realities of patients and healthcare professionals.

In conclusion, the adoption of diverse and accessible educational strategies should be encouraged as an integral part of care for individuals with Diabetes Mellitus, promoting diabetic foot prevention and improving clinical outcomes.

#### **References**

- [1]. Abrar, E. A. Et Al. Development And Evaluation Of Educational Videos On Diabetic Foot Care In Traditional Languages To Enhance Knowledge Of Patients Diagnosed With Diabetes And At Risk For Diabetic Foot Ulcers. *Primary Care Diabetes*, V. 14, N. 2, P. 104-110, 2020.
- [2]. Andrade, L. L. Et Al. Characterization And Treatment Of Diabetic Foot Ulcers In An Outpatient Clinic. *Revista Fun Care Online*, V. 11, N. 1, P. 124-128, 2019.
- [3]. Bodicoat, D. H. Et Al. The Impact Of A Program To Improve Quality Of Care For People With Type 2 Diabetes On Hard-To-Reach Groups: The Gedaps Study. *Primary Care Diabetes*, V. 9, N. 3, P. 211-218, 2015.
- [4]. Bortoletto, M. S. S.; Haddad, M. C. L.; Karino, M. E. Diabetic Foot: A Systematic Evaluation. *Archives Of Health Sciences Unipar, Umuarama*, V. 13, N. 1, P. 37-43, 2009.
- [5]. Brazil. Ministry Of Health. Consolidation Ordinance No. 2, Of September 28, 2017. Consolidation Of Rules On The National Health Policies Of The Unified Health System. Brasília, Df: Ministry Of Health, 2017.
- [6]. Brazil. National Policy On Strategic And Participatory Management In Sus - Participa Sus. Ministry Of Health. Executive Secretariat. Department Of Informatics Of Sus. 2nd Ed. Brasília: Ministry Of Health, 2009.
- [7]. Carvalho, M. D. Et Al. Prevalence Of Diabetes Mellitus As Determined By Glycated Hemoglobin In The Brazilian Adult Population, National Health Survey. *Revista Brasileira De Epidemiologia*, V. 22, N. 2, E190006, 2019.
- [8]. Ciryno, A. Et Al. Education For Type 2 Diabetes Mellitus Self-Care: From Compliance To Empowerment. *Interface: Communication, Health, Education, Botucatu*, V. 13, N. 30, P. 93-106, 2009.

- [9]. Cruz, A. R. R.; Melo, C. M. A.; Barbosa, C. O. Knowledge Of Diabetics About The Disease And Nutritional Treatment. *Revista Brasileira De Ciências Do Envelhecimento Humano*, Passo Fundo, V. 8, N. 3, P. 343-354, 2011.
- [10]. Despaigne, O. L. P. Et Al. Effectiveness Of An Educational Program For At-Risk Diabetic Foot Patients. *Medisan*, V. 19, N. 1, P. 69-77, 2015.
- [11]. Duarte, N.; Gonçalves, A. Diabetic Foot. *Revista De Angiologia E Cirurgia Vascular*, Pragal, V. 7, N. 2, 2011.
- [12]. Freire, P. *Pedagogy Of The Oppressed*. 6th Ed. Rio De Janeiro: Paz E Terra; 1978.
- [13]. Funnell, M. M. Et Al. National Standards For Diabetes Self-Management Education. *Diabetes Care*, Arlington, V. 31, Supplement 1, P. S97-S104, 2008.
- [14]. Galdino, Y. L. S. Et Al. Validation Of A Booklet On Self-Care With The Diabetic Foot. *Revista Brasileira De Enfermagem*, V. 72, N. 2, P. 780-787, 2019.
- [15]. Gomes, L. B.; Merhy, E. E. Understanding Popular Education In Health: A Study In Brazilian Literature. *Cadernos De Saúde Pública*, V. 27, N. 1, P. 7-18, 2011.
- [16]. Horta, C. Et Al. Evaluation Of The Amputation Rate In The Multidisciplinary Diabetic Foot Clinic. *Acta Médica Portuguesa*, Porto, V. 16, P. 373-380, 2003.
- [17]. Jarvis, J. Et Al. Diabetes Self-Management Education And Training For Adults With Type 2 Diabetes Mellitus. *Cochrane Database Of Systematic Reviews*, 2010.
- [18]. Keukenkamp, R. Et Al. An Explorative Study On The Efficacy And Feasibility Of The Use Of Motivational Interviewing To Improve Footwear Adherence In Persons With Diabetes At High Risk For Foot Ulceration. *Journal Of The American Podiatric Medical Association*, V. 108, N. 2, P. 90-99, 2018.
- [19]. Leite, F. E. O. P. C. Diabetic Foot. Dissertation (Master's In Angiology And Vascular Surgery), Faculty Of Medicine, University Of Porto, 2010.
- [20]. Leite, M. N. J.; Prado, C.; Peres, H. H. C. Health Education: Challenges For Innovative Practice. São Caetano Do Sul: Difusão, 2010.
- [21]. Lima, C. R.; Menezes, I. H. C. F.; Peixoto, M. R. G. Health Education: Evaluation Of An Educational Intervention For Diabetic Patients, Based On Social Cognitive Theory. *Ciência E Educação*, Bauru, V. 24, N. 1, P. 141-156, 2018.
- [22]. Liu, J. Et Al. The Effect Of Transitional Care On The Prevention Of Diabetic Foot Ulcers In Patients At High Risk For Diabetic Foot. *International Journal Of Diabetes In Developing Countries*, V. 39, N. 10, P. 659-666, 2019.
- [23]. Malta, D. C. Et Al. Noncommunicable Diseases And The Use Of Health Services: Analysis Of The National Health Survey In Brazil. *Revista De Saúde Pública*, V. 51, N.1, P. 1-10, 2017.
- [24]. Marinho, F.; Passos, V. M. A.; França, E. B. A New Century, New Challenges: Changes In The Burden Of Disease In Brazil From 1990 To 2010. *Epidemiologia E Serviços De Saúde*, V. 25, N.4, P; 713-724, 2016.
- [25]. Mendes, K. D. S. Et Al. Integrative Review: Research Method For Incorporating Evidence In Health And Nursing. *Texto & Contexto - Enfermagem*, V. 17, N. 4, P. 758-764, 2008.
- [26]. Moradi, A. Et Al. The Effect Of Short Message Service (Sms) On Knowledge And Preventive Behaviors Of Diabetic Foot Ulcer In Patients With Diabetes Type 2. *Diabetes & Metabolic Syndrome*, V. 13, N. 2, P. 1255-1260, 2019.
- [27]. Nguyen, T. P. L. Et Al. Effectiveness Of A Theory-Based Foot Care Education Program (3stepfun) In Improving Foot Self-Care Behaviors And Foot Risk Factors For Ulceration In People With Type 2 Diabetes. *Diabetes Research And Clinical Practice*, V. 152, P. 29-38, 2019.
- [28]. Norris, S. Et Al. Self-Management Education For Adults With Type 2 Diabetes: A Meta-Analysis Of The Effect On Glycemic Control. *Diabetes Care*, Arlington, V. 25, N. 7, P. 1159-1171, 2002.
- [29]. Oliveira, J. E. P. O.; Montenegro Jr., R. M.; Vencio, S. (Organizers). *Guidelines Of The Brazilian Diabetes Society 2017-2018*. São Paulo: Clannad Publishing, 2017.
- [30]. Otero, L. M.; Zanetti, M. L.; Ogrizio, M. D. Knowledge Of Diabetic Patients About Their Disease Before And After Implementing A Diabetes Education Program. *Revista Latino-Americana De Enfermagem*, Ribeirão Preto, V. 16, N. 2, P. 231-237, 2008.
- [31]. Reis, T. C. R. Et Al. Health Education: Historical Aspects In Brazil. *Journal Of Health Science Institute*, V. 31, N. 2, P. 219-223, 2013.
- [32]. Schoen, D. E. Et Al. Improving Rural And Remote Practitioners' Knowledge Of The Diabetic Foot: Findings From An Educational Intervention. *Journal Of Foot And Ankle Research*, V. 9, N. 26, 2016.
- [33]. Sekhar, S. Et Al. Development And Evaluation Of Patient Information Leaflet For Diabetic Foot Ulcer Patients. *International Journal Of Endocrinology And Metabolism*, V. 15, N. 3, E55454, 2017.
- [34]. Şen, H. M. Et Al. The Importance Of Education In Diabetic Foot Care Of Patients With Diabetic Neuropathy. *Experimental And Clinical Endocrinology & Diabetes*, V. 123, N. 3, P. 178-181, 2015.
- [35]. Sharoni, S. K. A.; Rahman, H. A. A Self-Efficacy Education Program On Foot Self-Care Behavior Among Older Patients With Diabetes In A Public Long-Term Care Institution, Malaysia: A Quasi-Experimental Pilot Study. *Bmj Open*, V. 7, N. 3, E014393, 2017.
- [36]. Silva, J. M. T. S. Et Al. Factors Associated With Foot Ulceration In People With Diabetes Mellitus Living In Rural Areas. *Revista Gaúcha De Enfermagem*, V. 38, N. 3, E68767, 2017.
- [37]. Brazilian Diabetes Society. *Diabetes: Nursing Manual*. Nursing Department Of The Brazilian Diabetes Society. São Paulo, 2009.
- [38]. Souza, I. C. Et Al. Construction And Evaluation Of A Booklet For The Prevention Of Foot Complications In Diabetics. *Revista Rene*, V. 22, E61427, 2021.
- [39]. Teston, E. F. Et Al. Nurses' Perspective On Health Education In Diabetes Mellitus Care. *Revista Brasileira De Enfermagem*, V. 71, N. 6, P. 2899-2907, 2018.
- [40]. Vedolin, A. C. Et Al. Diabetic Foot: A Comparative Study Of Different Clinical Presentations And Treatments. *Hospital De Clínicas*, Federal University Of Paraná, 2003.