applied sciences

MDPI

Brief Report

Self-Care Planning and Sanitary Education in the Prevention of the Diabetic Foot

Álvaro Astasio-Picado [1,*], Paula Cobos-Moreno [2] and Beatriz Gómez-Martín [2]

[1] Nursing and Physiotherapy Department, University of Castilla-La Mancha, Real Fábrica de Sedas, s/n. Talavera de la Reina (Toledo), 45600 Badajoz, Spain
[2] Nursing Department, University of Extremadura, 10600 Plasencia, Spain; pcmoreno@unex.es (P.C.-M.); bgm@unex.es (B.G.-M.)
* Correspondence: alvaro.astasio@uclm.com; Tel.: +34-925-721-010

Abstract: Diabetes Mellitus is the main cause of chronic patients in Spain. An equivocal exploration by the health worker and the client itself leads to the appearance of chronic complications, the most important being diabetic foot. The role of the health worker in the prevention and treatment of this is key. Objectives: This work has the general objective of identifying and providing information to the diabetic client about diabetic foot prevention and care elements to avoid complications. Data sources, study eligibility criteria: The search for the articles was carried out in various scientific databases with the help of a search string, which combined the keywords and Boolean operators. Study appraisal and synthesis methods: Thirty-seven papers were selected after a review of 101 articles. Results: The implementation of a health education program, in addition to performing multidisciplinary work, favors the prevention of diabetic foot ulcers and reduces the risk of amputation. Conclusions and implications of key findings: Nurses must have greater responsibility to inspire patients 'self-efficacy by making health education programs effective.

Keywords: diabetes; foot; ulcers; prevention; self-care; education

Citation: Astasio-Picado, Á.; Cobos-Moreno, P.; Gómez-Martín, B. Self-Care Planning and Sanitary Education in the Prevention of the Diabetic Foot. *Appl. Sci.* **2021**, *11*, 7281. https://doi.org/10.3390/app11167281

Academic Editor: Redha Taiar

Received: 9 July 2021
Accepted: 3 August 2021
Published: 7 August 2021

1. Introduction

Currently, Diabetes Mellitus (DM) is considered one of the most serious pathologies worldwide [1,2]. DM has a highly variable prevalence since it depends on the socioeconomic range and geographical area. Society has changed in the last century, making DM the leading cause of disease in North America and Europe, while in developing Asia and South America, this pathology is increasing. Similarly, many people are unaware that they have this disease [3,4]. In 2015, 422 million people were diagnosed with DM [2]. According to the International Diabetes Federation, in 2040, there will be 642 million diabetics [1]. These forecasts are attributed in part to the impoverishment of lifestyles, increasingly associated with a sedentary lifestyle and lousy food, population growth, aging, urbanization, and globalization [2]. The prognosis of DM is worrying due to the numerous chronic complications associated with said disease, which may be microvascular complications such as retinopathy, nephropathy or diabetic neuropathy (DN), or macrovascular complications such as coronary artery disease, stroke, or vascular disease peripheral (PVD), in addition to the neurological complications associated with diabetic foot (PD) [3,4]. The microvascular complication that most frequently produces the appearance of PD is DN, affecting half of the patients after two decades of evolution due to hyperglycemia. The PD is the demyelination of the neuronal axons as a consequence of hyperglycemia maintained over time, which causes the functional and structural deterioration of the peripheral nerves, causing a lack of peripheral sensitivity, deformities, and ulcerations. The infection or ulceration process is not only associated with neurological failures but also with different degrees of PVD that in diabetic lower limbs (MMII) is known as PD [1].

Globally, diabetic patients have an incidence of ulcerated PD of around 20%, having a 40% chance of recurrence of healed ulcers in the first year [2], being more susceptible to loss of MMII [3]. It is considered an incapacitating, irreversible, and costly complication of DM, with a series of social, mental, and physical consequences [4]. It is important to know that DM has no cure today, but there is a treatment to avoid the consequent problems through the control of risk factors such as the management of the glycemic level, blood pressure, and cholesterol levels, in addition to others such as weight, diet, or level of physical activity [3]. Also, one of the most important risk factors, according to the American Diabetes Association, is poor therapeutic education. This emphasizes the educational orientation for the prevention of these complications, strengthening the importance of the prevention of ulcerations in the MMII through their daily care [1]. A large number of diabetic patients do not have the necessary knowledge to care for MMII; however, an essential element in PD intervention is patient collaboration [2].

In DN, sensory symptoms on motors stand out [5]. The effect of sensory neuropathy is loss of sensitivity, leaving the foot fragile in the face of bruises that cause a break in the skin, resulting in the appearance of ulcers on the foot [2]. Motor neuropathy leads to structural deformity of the foot. These deformities increase the mechanical pressure on the metatarsal heads and phalanges, inducing the appearance of ulcers in the PD [2]. The circulatory and sweat systems are compromised by autonomic neuropathy and impaired nerves, reducing perspiration, leaving the skin dry, and favoring the appearance of hyperkeratosis due to mechanical pressure, which makes it more susceptible to the appearance of injuries [5]. At the same time, poor vascular perfusion produced by PVD and immunity prevents wound healing, making the risk of infection higher [5].

All these etiological factors (neuropathy, PVD, infection, etc.) can be reduced by knowing various risk factors for the disease, allowing us to act correctly and at the right time, thus facilitating PD prevention, improving quality of life [6,7]. Risk factors are as follows [7–9]: hyperglycemia maintained over time favors DN and infections; hypertension, hyperlipemia, or smoking are also associated with PVD, stroke, or ischemic heart disease; sedentary lifestyle and diet are associated with obesity, which is closely related to the appearance of DM. In addition, this, together with the deformity of the feet, causes an erratic distribution of weight to occur, creating excessive pressure zones, age, the risk of which increases in people over 50 years of age, the educational level, observing that those with a greater range of knowledge have a higher level of self-care knowledge and go to their Primary Care (PC) center in less time.

Today, diabetic patients know the problems that this pathology can cause them, but they are not usually aware of the prevention and care of MMIIs [1,2]. Most of them directly associate age and DM with the appearance of ulcers, gangrene, and finally amputation, which is why they have poor attendance at health services [4]. At the same time, many patients are unable to obtain effective prevention and health education due to the low sensitivity of healthcare professionals and the short attention time due to the overload of consultations [10].

The general objective of this work is to identify and provide information to the diabetic client on the elements of prevention and care of the diabetic foot to avoid complications.

2. Materials and Methods

The elaboration of this work was carried out by means of a bibliographic review, of a systematic type, of the articles found by searching the following databases: Medline/Pubmed, Cochrane, Research care, Elsevier/EMBASE, and Scopus. To find the best possible scientific evidence, a series of inclusion and exclusion criteria were applied.

The keywords in this review were: Diabetes, foot, ulcers, prevention, self-care, and education. To perform the bibliographic search, different keywords were used in English, such as: "Diabetic foot", "Risk foot", ulcers, ulceration, prevention, health, nursing, nurse, "self-care", care, education. Once selected, the corresponding Boolean operators: AND/OR, as well as the necessary parentheses and quotation marks, were used. The final search string

is as follows: ("Diabetic foot" OR "Risk foot") AND (ulcers OR ulceration) AND prevention AND health AND (nursing OR nurse) AND ("self-care" OR care) AND education. The criteria that have been taken into account for the selection of the relevant studies are the following. Inclusion criteria: the period between 2010 and 2021; type of article: article review and article research; field: nursing, English language. Exclusion criteria: articles prior to 2010; language: not English.

3. Results

Below is a table that shows the search strategy used to select the 37 selected articles (Table 1):

Table 1. Databases consulted.

Item Criteria	Medline/ Pubmed	Cohrane	Research Care	Elsevier/ Embase	Scopus	Total
Identified	26	7	21	53	7	114
Duplicates	3	2	3	4	2	14
Title	4	1	3	8	1	17
Abstract	5	1	6	18	1	31
Text complete	1	1	5	9	1	17
Valid	13	3	4	14	3	37

The results obtained show how a PD prevention program should contemplate [10–12]: Initial evaluation: carry out an anamnesis indicating the type of DM, personal and family history, smoking and alcohol consumption, lifestyle or eating habits [13–23]. Give information about nutrition, exercise, and illness, and review drug treatment and care plan [16,17,19]. Annual physical examination: BMI, blood pressure, and foot examination, in which a review of the skin, onychopathies, structural deformities, presence of edema, measurement of temperature, and presence of pain is carried out [7,13–16]. Vascular examination of the feet: anamnesis to determine the existence or not of intermittent claudication, palpation of pediatric, tibial, popliteal, and femoral pulses, and an ankle-brachial index test (ABI) are carried out to indicate the degree of ischemia [24–29]. Neurological examination: perform a superficial sensitivity test that evaluates touch, pain, and temperature, as well as a deep sensitivity test with a tuning fork and Semmes-Weinstein monofilament [30,31]. Request for additional tests: glycated hemoglobin should be performed twice a year, but if it is $\geq$8%, it should be performed every 3 months, an annual analytical study, the fundus examination, and an electrocardiogram every 5 years [32–36]. This program tries to prevent the appearance of ulcers in the MMII of the diabetic patient due to the existence of risk factors that favor its appearance [11,35,37]. Nursing professionals must know how to manage the ulcer. The main objective is the elimination of tissue necrosis and the control of bacterial load and exudation, facilitating the development of healthy tissue [10,33]. Before starting the removal of the necrotic tissue, the wound is washed with saline solution, drying it later without exerting too much force, avoiding deterioration of the new tissue [5,9]. In order to carry out a correct prevention of PD, it is not enough to carry out a health education program aimed at the patients themselves, but must also be addressed to family members and caregivers in their care [4,11–13]. Nursing professionals must train on the meaning of prevention measures in the future [12,37].

4. Discussion

Regarding PD self-care, the authors agree that the implementation of a health education program (HEP), in addition to multidisciplinary work, favors the prevention of PD ulcers and reduces the risk of amputation [1,4,6,9,10]. It is observed that patients with a lower educational level, a lower income, and who also have worse eating habits and glycemic controls are more likely to develop PD complications [3,12,37]. Studies showing

intensive health education programs have better results in the incidence of PD ulcers [2,7]. Nurses should have greater responsibility and inspire self-efficacy in the patient [27,28].

The use of infrared thermometers has been shown to detect the thermal rise that allows action before ulcers appear [17,22–24,34]. A certain preventive approach is needed since the risk factors for PD are different according to sex, with the use of insulin, neuropathies, ulcers, numbness, and stiffness of MMII standing out in women, hyperkeratosis and claw fingers [31].

PD ulcer prevention measures have been identified: A health education program for the patient, type of footwear, use of socks, avoiding pressure zones, teaching the proper way to cut the nails, reporting any injury, pain, or temperature change in the feet, daily foot washing, identifying and managing PVD and infectious processes [33]. Creating an instrument to evaluate PD facilitates the diagnosis and treatment of complications [14]. Performing Buerger exercises improves neuropathy and peripheral circulation [15].

Likewise, measures have also been identified to examine the feet in consultation: palpation of the pediatric pulses, check sensitivity with monofilament or tuning fork, observe hyperkeratosis or nails, examine deformities, history of previous ulcers, check for signs of ulceration, examine any pain, and inspect footwear [16,19,25]. Home nursing interventions are described: assessment of metabolic status (glycemic control, HbA1c, weight, BMI, and nutrition), complications (blood pressure measurement, ABI, measurement of sensitivity and foot care), and health education program [21,27,28,35]. The best care at home is related to greater experience, interdisciplinary work, and health education programs [35].

The main treatment of the ulcer is to eliminate necrosis and control exudation, favoring healthy tissue. To eliminate necrosis, after washing with serum, debridement is performed, which can be cutting, enzymatic or autolytic, infection management, maintenance of perilesional skin, control of paresthesia and disease [5,19,26].

Neuropathic ulcers are observed to heal earlier, but it depends on the related factors of healing: age and values of pressure and tissue-perfusion [32].

A health education program (HEP) for PD prevention and self-care must follow the following recommendations [4,6,12,13,22,37–39]:

1. Perform a daily foot examination, observing color and temperature, paying special attention to interdigital spaces where blisters, wounds, maceration, or excoriation can be found. With the help of a mirror, you should also inspect the sole and heel of the foot.
2. Wash your feet with water and neutral soap without exceeding 5 min. Rinse the soap with warm water and dry carefully, especially the interdigital spaces. Pat dry, neve rub.
3. Do not use excessively hot water for foot washing. The water temperature should not exceed 37 °C.
4. Use moisturizer after hygiene, but never between the toes due to the possibility of maceration.
5. Never walk barefoot, without socks, or wear patched socks, as these increase pressure in the patched area, and change socks daily.
6. Walk with wide shoes that guarantee support with a wide toe, allowing the toes to move, and wear a non-slip sole.
7. Do not wear too flat shoes or very high heels.
8. Renew shoes periodically.
9. Do not apply heat directly to warm the feet.
10. See a podiatrist to remove hyperkeratosis or ingrown nails.
11. Cut the nails straight, do not rush the cut or file the nails smoothly.
12. Prevent bed sheets from putting pressure on your feet.
13. Raise your feet if you sit for a long time, promoting circulation.
14. Control the glycemic level.
15. Avoid alcohol and tobacco.
16. Walk every day with comfortable and suitable footwear.

17. Follow a healthy and balanced diet.
18. See a healthcare professional at any sign of redness, swelling, or injury.

5. Conclusions

It is observed that the best care is related to a greater work experience, a good multidisciplinary job, and having a health education program. The multidisciplinary team should prioritize activities of physical assessment, metabolic assessment, neurological and vascular control. Similarly, there is evidence of the need for nurses to have greater responsibility in the care plan to increase self-confidence in the patient, especially in those patients with a low socioeconomic and educational level.

Author Contributions: Conceptualization, B.G.-M. and P.C.-M.; methodology, Á.A.-P.; software, B.G.-M.; validation, B.G.-M., P.C.-M. and Á.A.-P. formal analysis, Á.A.-P. investigation, Á.A.-P.; resources, P.C.-M.; data curation, B.G.-M.; writing—original draft preparation, Á.A.-P.; writing—review and editing, Á.A.-P.; visualization, B.G.-M. supervision, Á.A.-P.; project administration, Á.A.-P. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

Abbreviations

ABI	Ankle-brachial index test
DM	Diabetes Mellitus
PD	Diabetic foot
DN	Diabetic neuropathy
HEP	Health education program
MMII	Lower limbs
PC	Primary care
PVD	Vascular disease peripheral

References

1. Dean, A.; Magalhaes, T.; Soares, A.; Carvalho, R. Nursing Interventions for Prevention of Foot Ulcers in Patients with Diabetes: An Integrative Review. *Int. Arch. Med.* **2017**, *10*, 163. Available online: https://www.researchgate.net/publication/316911549_Nursing_Interventions_for_Prevention_of_Foot_Ulcers_in_Patients_with_Diabetes_an_Integrative_Review (accessed on 14 March 2021).
2. Adiewere, P.; Gillis, R.B.; Jiwani, S.I.; Meal, A.; Shaw, I.; Adams, G.G. A systematic review and meta-analysis of patient education in preventing and reducing the incidence or recurrence of adult diabetes foot ulcers (DFU). *Heliyon* **2018**, *4*, e00614. Available online: https://www.sciencedirect.com/science/article/pii/S2405844018301403 (accessed on 14 March 2021). [CrossRef] [PubMed]
3. Al-Kaabi, J.M.; Al Maskari, F.; Cragg, P.; Afandi, B.; Souid, A.K. Illiteracy and diabetic foot complications. *Prim. Care Diabetes* **2015**, *9*, 465–472. Available online: https://www.ncbi.nlm.nih.gov/pubmed/26027780 (accessed on 14 March 2021). [CrossRef]
4. Nather, A.; Cao, S.; Chen, J.L.W.; Low, A.Y. Prevention of diabetic foot complications. *Singap. Med. J.* **2018**, *59*, 291–294. Available online: https://www.ncbi.nlm.nih.gov/pubmed/29974120 (accessed on 14 March 2021). [CrossRef] [PubMed]
5. Boulton, A. The diabetic foot. *Medicine* **2010**, *38*, 644–648. Available online: https://www.sciencedirect.com/science/article/pii/S1357303910002124 (accessed on 14 March 2021). [CrossRef]
6. Ahmad, S.K.; Minhat, H.S.; Mohd, N.A.; Baharom, A. Health education programmes to improve foot self-care practices and foot problems among older people with diabetes: A systematic review. *Int. J. Older. People Nurs.* **2016**, *11*, 214–239. Available online: https://www.ncbi.nlm.nih.gov/pubmed/26916809 (accessed on 14 March 2021). [CrossRef]
7. Ren, M.; Yang, C.; Lin, D.; Xiao, H.; Mai, L.; Guo, Y.; Yan, L. Effect of intensive nursing education on the prevention of diabetic foot ulceration among patients with high-risk diabetic foot: A follow-up analysis. *Diabetes Technol. Ther.* **2014**, *16*, 576–581. Available online: https://www.ncbi.nlm.nih.gov/pubmed/25004241 (accessed on 14 March 2021). [CrossRef] [PubMed]

8. Madanchi, N.; Tabatabaei, O.; Pajouhi, M.; Heshmat, R.; Larijani, B.; Mohajeri Tehrani, M.R. Who are diabetic foot patients? A descriptive study on 873 patients. *J. Diabetes Metab. Disord.* **2013**, *12*, 36. Available online: https://www.researchgate.net/publication/245536804_Who_are_diabetic_foot_patients_A_descriptive_study_on_873_patients (accessed on 14 March 2021). [CrossRef]
9. Farbod, E.; Farzaneh, T.; Mahnaz, S. Empowerment of type 2 diabetic patients visiting Fuladshahr diabetes clinics for prevention of diabetic foot. *Diabetes Metab. Syndr.* **2018**, *12*, 853–858. Available online: https://www.sciencedirect.com/science/article/abs/pii/S1871402118301395 (accessed on 14 March 2021).
10. Tabitha, H.; Marilyn, H. Implementing Diabetic Foot Care in the Primary Care Setting. *J. Nurse Pract.* **2017**, *13*, 129–132. Available online: https://www.sciencedirect.com/science/article/pii/S1555415516306857 (accessed on 14 March 2021).
11. Nemcová, J.; Hlinková, E. The efficacy of diabetic foot care education. *J. Clin. Nurs.* **2014**, *23*, 877–882. Available online: https://www.ncbi.nlm.nih.gov/pubmed/23875608 (accessed on 14 March 2021). [CrossRef] [PubMed]
12. D'Souza, M.S.; Ruppert, S.D.; Parahoo, K.; Karkada, S.N.; Amirtharaj, A.; Jacob, D.; Balachandran, S.; Al Salmi, N.M. Foot care behaviors among adults with type 2 diabetes. *Prim. Care Diabetes* **2016**, *10*, 442–451. Available online: https://www.ncbi.nlm.nih.gov/pubmed/27282830 (accessed on 14 March 2021). [CrossRef] [PubMed]
13. Chin, Y.F.; Liang, J.; Wang, W.S.; Hsu, B.R.; Huang, T.T. The role of foot self-care behavior on developing foot ulcers in diabetic patients with peripheral neuropathy: A prospective study. *Int. J. Nurs. Stud.* **2014**, *51*, 1568–1574. Available online: https://www.ncbi.nlm.nih.gov/pubmed/24866324 (accessed on 14 March 2021). [CrossRef]
14. Persaud, R.; Coutts, P.M.; Brandon, A.; Verma, L.; Elliott, J.A.; Sibbald, R.G. Validation of the Healthy Foot Screen: A Novel Assessment Tool for Common Clinical Abnormalities. *Adv. Ski. Wound Care* **2018**, *31*, 154–162. Available online: https://www.ncbi.nlm.nih.gov/pubmed/29561340 (accessed on 14 March 2021). [CrossRef]
15. Chang, C.F.; Chang, C.C.; Hwang, S.L.; Chen, M.Y. Effects of Buerger Exercise Combined Health-Promoting Program on Peripheral Neurovasculopathy among Community Residents at High Risk for Diabetic Foot Ulceration. *Worldviews Evid. Based Nurs.* **2015**, *12*, 145–153. Available online: https://www.ncbi.nlm.nih.gov/pubmed/25963925 (accessed on 14 March 2021). [CrossRef]
16. Turns, M. Prevention and management of diabetic foot ulcers. *Br. J. Community Nurs.* **2015**, S30, S32, S30–S37. Available online: https://www.ncbi.nlm.nih.gov/pubmed/25757381 (accessed on 14 March 2021). [CrossRef] [PubMed]
17. Sibbald, R.G.; Mufti, A.; Armstrong, D.G. Infrared skin thermometry: An underutilized cost-effective tool for routine wound care practice and patient high-risk diabetic foot self-monitoring. *Adv. Ski. Wound Care* **2015**, *28*, 37–44. Available online: https://www.ncbi.nlm.nih.gov/pubmed/25502975 (accessed on 14 March 2021). [CrossRef]
18. Fan, L.; Sidani, S.; Cooper-Brathwaite, A.; Metcalfe, K. Feasibility, acceptability and effects of a foot self-care educational intervention on minor foot problems in adult patients with diabetes at low risk for foot ulceration: A pilot study. *Can. J. Diabetes* **2013**, *37*, 195–201. Available online: https://www.ncbi.nlm.nih.gov/pubmed/24070843 (accessed on 14 March 2021). [CrossRef]
19. Crawford, P.E.; Fields-Varnado, M.; WOCN Society. Guideline for the management of wounds in patients with lower-extremity neuropathic disease: An executive summary. *J. Wound Ostomy Cont. Nurs.* **2013**, *40*, 34–45. Available online: https://www.ncbi.nlm.nih.gov/pubmed/23222969 (accessed on 14 March 2021). [CrossRef]
20. Ran, X.W.; Zhao, J.C. The importance of multidisciplinary foot-care services in the management of diabetic patients with peripheral artery disease and diabetic foot ulcers. *J. Sichuan Univ. Med Sci. Ed.* **2012**, *43*, 728–733.
21. Gershater, M.A.; Pilhammar, E.; Roijer, C.A. Documentation of diabetes care in home nursing service in a Swedish municipality: A cross-sectional study on nurses documentation. *Scand. J. Caring Sci.* **2011**, *25*, 220–226. [CrossRef]
22. Lazo-Porras, M.; Bernabe-Ortiz, A.; Sacksteder, K.A.; Gilman, R.H.; Malaga, G.; Armstrong, D.G.; Jaime, J. Implementation of foot thermometry plus mHealth to prevent diabetic foot ulcers: Study protocol for a randomized controlled trial. *Trials* **2016**, *17*, 206. [CrossRef] [PubMed]
23. Skafjeld, A.; Iversen, M.M.; Holme, I.; Ribu, L.; Hvaal, K.; Kilhovd, B.K. A pilot study testing the feasibility of skin temperature monitoring to reduce recurrent foot ulcers in patients with diabetes—A randomized controlled trial. *BMC Endocr. Disord.* **2015**, *15*, 55. [CrossRef] [PubMed]
24. Stevens, K. Foot Intervention Study Utilizing Commercially Available Infrared Thermometers with Individuals with Diabetes. *Clin Trials.* **2018**, *1*, 24–29.
25. Woo, K.Y.; Botros, M.; Kuhnke, J.; Evans, R.; Alavi, A. Best practices for the management of foot ulcers in people with diabetes. *Adv. Ski. Wound Care* **2013**, *26*, 512–524. [CrossRef] [PubMed]
26. Annersten, M.; Pilhammar, E.; Alm, C. Prevention of foot ulcers in patients with diabetes in home nursing: A qualitative interview study. *Eur. Diabetes Nurs.* **2013**, *10*, 52–57. [CrossRef]
27. Wedling, S.; Beadle, V. The relationship between self-efficacy and diabetic foot self-care. *J. Clin. Transl. Endocrinol.* **2015**, *2*, 37–41. Available online: https://www.sciencedirect.com/science/article/pii/S2214623715000459 (accessed on 14 March 2021).
28. Monteiro-Soares, M.; Ribas, R.; da Silva, C.P.; Bral, T.; Mota, A.; Torres, S.P.; Morgado, A.; Couceiro, R.; Ribeiro, R.; Dias, V.; et al. Diabetic foot ulcer development risk classifications' validation: A multicentre prospective cohort study. *Diabetes Res. Clin. Pract.* **2017**, *127*, 105–114. Available online: https://www.sciencedirect.com/science/article/pii/S0168822716306349 (accessed on 14 March 2021). [CrossRef]

29. Afsaneh Alavi, R.; Sibbald, G.; Mayer, D.; Goodman, L.; Botros, M.; Armstrong, D.G.; Woo, K.; Boeni, T.; Ayello, E.A.; Kirsner, R.S. Diabetic foot ulcers: Part II. *Management. J. Am. Acad. Dermatol.* **2014**, *70*, 21–24. Available online: https://www.sciencedirect.com/science/article/pii/S0190962213008219 (accessed on 14 March 2021).
30. Navarro-Peternella, F.M.; Torquato, A.P.; Arruda, G.O.; Teston, E.F.; Marcon, S.S. Differences between genders in relation to factors associated with risk of diabetic foot in elderly persons: A cross-sectional trial. *J. Clin. Trans. Endocrinol.* **2016**, *6*, 30–36. Available online: https://www.sciencedirect.com/science/article/pii/S2214623716300369 (accessed on 14 March 2021). [CrossRef]
31. Yotsu, R.R.; Pham, N.M.; Oe, M.; Nagase, T.; Sanada, H.; Hara, H.; Fukuda, S.; Fujitani, J.; Yamamoto-Honda, R.; Kajio, H.; et al. Comparision of characteristics and healing course of diabetic foot ulcers by etiological classification: Neuropathic, ischemic and nuero-ischemic type. *J. Diabetes Complicat.* **2014**, *28*, 528–535. Available online: https://www.sciencedirect.com/science/article/pii/S1056872714000683 (accessed on 14 March 2021). [CrossRef] [PubMed]
32. Schaper, N.C.; Van Netten, J.J.; Apelqvist, J.; Lipsky, B.A.; Bakker, K. Prevention and management of foot problems in diabetes: A Summary Guidance for Daily Practice 2015, base don the IWGDF guidance documenrs. *Diabetes Res. Clin. Pract.* **2017**, *124*, 84–92. Available online: https://www.sciencedirect.com/science/article/pii/S0168822716317867 (accessed on 14 March 2021). [CrossRef] [PubMed]
33. Nishide, K.; Nagase, T.; Oba, M.; Oe, M.; Ohashi, Y.; Iizaka, S.; Nakagami, G.; Kadowaki, T.; Sanada, H. Ultrasonographic and thermographic screening for latent inflammation in diabetic foot callus. *Diabetes Res. Clin. Pract.* **2009**, *85*, 304–309. Available online: https://www.sciencedirect.com/science/article/pii/S0168822709002460 (accessed on 14 March 2021). [CrossRef] [PubMed]
34. Stolt, M.; Suhonen, R.; Puukka, P.; Viitanen, M.; Voutilainen, P.; Leino-Kilpi, H. Nurses' foot care activities in home health care. *Geriatr. Nur.* **2013**, *34*, 491–497. Available online: https://www.sciencedirect.com/science/article/pii/S019745721300270X (accessed on 14 March 2021). [CrossRef]
35. Ritchie, L.; Prentice, D. An exploration of nurses' perceptions regarding the implementation of a best practice guideline on the assessment and management of foot ulcers for people with diabetes. *Appl. Nurs. Res.* **2011**, *24*, 88–93. Available online: https://www.sciencedirect.com/science/article/pii/S0897189709000755 (accessed on 14 March 2021). [CrossRef]
36. Ghandour, R.; Mikki, N.; Abu Rmeileh, N.M.E.; Jerdén, L.; Norberg, M.; Eriksson, J.; Husseini, A. Complications of type 2 diabetes mellitus in Ramallah and al-Bireh: The Palestinian Diabetes Complications and Control Study (PDCCS). *Prim. Care Diabetes* **2018**, *12*, 547–557. Available online: https://www.sciencedirect.com/science/article/pii/S1751991818301955 (accessed on 14 March 2021). [CrossRef]
37. Astasio-Picado, Á.; Escamilla Martínez, E.; Gómez-Martín, B. Comparative thermal map of the foot between patients with and without diabetes through the use of infrared thermography. *Enfermería Clínica* **2020**, *30*, 119–123. [CrossRef]
38. Astasio-Picado, Á.; Martínez, E.E.; Gómez-Martín, B. Comparison of Thermal Foot Maps between Diabetic Patients with Neuropathic, Vascular, Neurovascular, and No Complications. *Curr. Diabetes Rev.* **2019**, *15*, 503–509. [CrossRef]
39. Lung, C.W.; Wu, F.L.; Liao, F.; Pu, F.; Fan, Y.; Jan, Y.K. Emerging technologies for the prevention and management of diabetic foot ulcers. *J. Tissue Viability* **2020**, *29*, 61–68. [CrossRef]