

## Patient Education on Footwear for Patients with Diabetic foot Problems

Ang Yi Yen, Zest<sup>1</sup>, Wee Lin<sup>2</sup>, Lim Qiao Yan, Eda<sup>3</sup>, Wong Le Yi, Joy<sup>4</sup>, Chan Shu-Yi, Claire<sup>5</sup>, Malhotra Rishi<sup>6</sup> and Aziz Nather<sup>7\*</sup>

<sup>1,2,3,4,5,6,7</sup>Department of Orthopaedic Surgery, National University Health System, Singapore

**\*Corresponding Author:** Associate Professor Aziz Nather, Senior Consultant University Orthopaedics, Hand & Reconstructive Microsurgery Cluster National University Health System, Singapore.

**Received:** December 15, 2016; **Published:** December 19, 2016

### Abstract

**Introduction:** The key to the management of diabetic foot complications is prevention. To achieve this, good education guides must be made available to teach patients on care of diabetes, foot care and footwear. There are few packages available specifically on footwear—they are typically grouped under footwear and thus not given comprehensive coverage.

**Objectives:** The objectives of this project were first to design a survey questionnaire covering comprehensively on all possible aspects patients need to know on footwear. Based on results of the survey, we want to design a new education package better suited to teach patients on all inpatient aspects of footwear.

**Materials and methods:** The survey was conducted on a cohort of 40 patients with diabetic foot problems managed by the National University Hospital Diabetic Foot Team from February 2014 to May 2014. The package was then specifically designed to cover all gaps in knowledge on diabetic footwear. It is written in English in an easily readable fashion, and with good illustrations.

**Results:** A total of 40 subjects were interviewed. The “correct answer” percentages range for the individual sections in each section ranges from 72.5-73% (Traits of good and bad shoes), 15-95% (Parts of a shoe), 88% (accessory items like socks), 20-70% (Choosing a shoe) and 65-95% (Common local misconceptions).

**Conclusion:** Our survey revealed that patients lacked knowledge in certain areas of footwear. Our education package has been specifically tailored to suit the needs of the local population—it covers footwear to provide a holistic understanding, with added emphasis on weaker areas revealed by the questionnaire. We believed that the combination of lifestyle habits and appropriate footwear as enabled by a good education package, can play a significant role in ensuring healthy feet in high-risk people with diabetes.

**Keywords:** Patient education; Footwear; Diabetic Foot Problems

Volume 1 Issue 2 December 2016

© All Copy rights are reserved by Aziz Nather, *et al.*

### Introduction

The type 2 diabetes mellitus is increasingly common in Singapore, with prevalence rising from 2% in 1975 to 9% in 1998 [1]. People who have diabetes are vulnerable to nerve and vascular damage that can result in loss of protective sensation in the feet. Even minor trauma can lead to developments of chronic ulcers, making diabetics prone to diabetic foot problems like foot deformity, ulceration, infection and amputation. Up to 15% of patients with diabetes may develop foot ulcers in their lifetime [2-6], which cause significant pain and contribute to high medical costs for the patient.

**Citation:** Aziz Nather, *et al.* “Patient Education on Footwear for Patients with Diabetic foot Problems”. *Orthopaedic Surgery and Traumatology* 1.2 (2016): 76-84.

For diabetic patients in particular, poorly fitting footwear can cause pressure areas that have higher risk of developing callosities and ulcerations. It can also delay wound healing and increase the risk of infection. Studies have also shown how foot ulcers and amputation in patients with diabetes are mostly self-induced due to a lack of footwear education and poorly fitting footwear [7-9]. On the other hand, proper footwear can circumvent diabetic foot problems, as decreased reulceration was reported in several studies when patients wear proper prescription footwear [10]. Hence, diabetic patients need to be given good footwear education to prevent the development of diabetic foot complications and greatly reduce the chances of amputation.

However, as research on diabetic footwear is limited in Singapore, the crafting of education packages is difficult due to scant understanding on what patients know about footwear. Thus, the aims of this paper are to uncover what diabetic patients lack knowledge on, and then apply the results in shaping our education package.

After a thorough literature review, we carefully devised a comprehensive questionnaire that covers the broad-ranging topics of footwear. The topics range from parts of a shoe, types of good and bad shoes, things to do before putting shoes on, things to note when purchasing shoes, and shoe accessories like socks. Results from the questionnaire were subsequently applied in shaping our education package.

## Methodology

### Materials

The questionnaire was carried out on diabetic patients with history of foot ulcerations. Our diabetic patients were under the care of the diabetic foot team at National University Hospital Singapore, headed by the senior author (Aziz Nather). The group was of sample size  $n = 40$ , with main age of 51.4 yrs. Inclusion criteria include i) type 2 diabetes patients, ii) age between 39-70 years old, iii) conversant in English, and iv) willing to participate in the study.

### Methods

#### Questionnaire

Prior to designing our own package, a thorough literature review on questionnaires on footwear currently available was performed.

We realised questionnaires typically cover several but not all aspects of footwear [11-13]. Certain areas are commonly emphasized-such as traits of good or bad shoes, but other areas are typically not mentioned-such as safety checks before putting shoes on, or common local malpractices [14].

We realised most questionnaires are not tailored to our local context. Thus the scope of available questionnaires did not address misconceptions that our patients have. Thus, with the limitations of pre-existing questionnaires in mind, we incorporated input from the NUH Podiatry Department and designed a comprehensive syllabus on footwear for our education package. Our questionnaire covers the following content as shown in Table 1:

Section	Question
Traits of good and bad shoes, with examples	1, 2
Parts of a shoe	3, 4, 5
Accessory items like socks	6
Choosing a shoe	7, 8, 9, 10
Common misconceptions tailored to the local context	12, 13, 14, 15

**Table 1:** Table showing content scope of questionnaire.

**Easily comprehensible**

Studies have proven the importance of readability in making the questionnaire applicable to patients with low literacy [15]. We have tailored ours to be simple, easily comprehensible and therefore friendly to all our patients.

**Short length**

Studies have proven that questionnaires should be completed within 5-15 min and kept within 15 questions, to make it feasible to be applied in a busy clinical setting and to avoid tiring patients out [15]. Hence, we have condensed our questionnaire to cover comprehensive aspects of footwear to include 15 questions only.

After identifying unaddressed areas that other questionnaires failed to address, we designed a questionnaire covering all aspects of footwear that patients will need to know, to effectively evaluate the knowledge patients have on footwear. Our final questionnaire is shown in Table 2:

Topic	Number of questions
What is a good/bad shoe	2
Parts of a shoe	
-Shoe box	1
-Back of shoe	1
-Sole	1
Choosing footwear	2
Socks	2
Material of shoe	1
Before wearing your shoe	1
Common misconceptions	4
Total	15

**Table 2:** Scope of questionnaire.

The questionnaire was in Multiple Choice Questions (MCQ) format, and questions with “Yes”, “No” and “I don’t know” as options. The “I don’t know” option was used, as studies have proven it prevents guessing and acts as a better gauge of the patients’ knowledge [16].

Our final questionnaire is included as Figure 1:

1. Diabetics should choose shoes with Velcro straps or laces.
  - a) Yes
  - b) No
  - c) I don’t know
2. It is alright for DM patients to wear slippers or sandals.
  - a) Yes
  - b) No
  - c) I don’t know
3. Shoes should have tight shoeboxes.
  - a) Yes
  - b) No
  - c) I don’t know

4. It is alright to wear thin-soled shoes.

- a) Yes
- b) No
- c) I don't know

5. Choose shoes with a flexible back.

- a) Yes
- b) No
- c) I don't know

6. Wear tight socks.

- a) Yes
- b) No
- c) I don't know

7. You need not wear socks when trying shoes on.

- a) Yes
- b) No
- c) I don't know

8. You can ask a family member to purchase your shoe if they know your shoe size.

- a) Yes
- b) No
- c) I don't know

9. You should buy shoes in the afternoon.

- a) Yes
- b) No
- c) I don't know

10. DM patients should select shoes made of

- a) Hard plastic
- b) Rubber
- c) Leather
- d) I don't know

11. How often do you need to check your shoes?

- a) Every time you put your shoes on
- b) Weekly
- c) Monthly
- d) I don't know

12. It is alright to go barefoot at home.

- a) Yes
- b) No
- c) I don't know

13. Massage slippers are good for DM patients.

- a) Yes
- b) No
- c) I don't know

14. Shoes should be tight fitting.
- Yes
  - No
  - I don't know
15. Diabetics need only 1 pair of shoes.
- Yes
  - No
  - I don't know

**Figure 1:** Our questionnaire on footwear, tailored to specifically suit the local context.

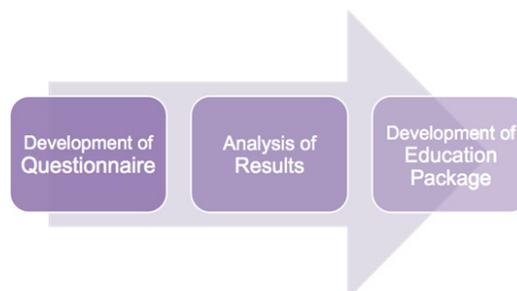
### Interview

Our method of conducting the survey questionnaire was an oral interview in English. Prior to starting the questionnaire, a detailed patient history was taken regarding sociodemographic characteristics (income level, schooling, occupation), marital status, and clinical features (duration of diabetes, treatment method for diabetes). This was to take into account any possible confounding factors.

### Education package

We analysed the answers to our questionnaire given by the patients, and thereafter deduced the content to be included in our education package. Questions that were largely incorrectly answered were given greater emphasis in our package.

An overview of our methodology is given in Figure 2 below.



**Figure 2:** Summary of methodology of survey questionnaire.

## Results of Questionnaire

### Knowledge about traits of good and bad shoes

Analysis of our questionnaire revealed most patients are familiar with only certain types of shoes. 72.5% of our patients correctly answered that good shoes are those with Velcro straps or laces, and 73% of our patients correctly answered that Diabetics should avoid slippers or sandals. However, only 65% knew that massage slippers are not suitable for diabetics.

### Parts of a shoe

Amongst the different parts of a shoe of shoe boxes, soles and backs of a shoe, most patients knew about shoe boxes and soles. 95% of patients are aware that shoes should not have tight shoeboxes, and 73% answered correctly that soles of shoes should be thick. However, most patients (85%) incorrectly believe the backs of a shoe should flexible, rather than supportive and sturdy.

### Choosing a shoe

Most patients (70%) correctly answered that they should wear socks when trying shoes on, and most also (63%) knew not to ask a family member to purchase a shoe in place of them. However, there is a salient gap in knowledge about the time of the day during which

**Citation:** Aziz Nather, *et al.* "Patient Education on Footwear for Patients with Diabetic foot Problems". *Orthopaedic Surgery and Traumatology* 1.2 (2016): 76-84.

one should go shopping for shoes. 81% of respondents did not know that shoes should be bought in the afternoon. 28% of patients understand that leather is the best material for shoes, but an equal number (28%) of correspondents also wrongly selected rubber. 21% of patients do not know which material to choose.

**Before wearing your shoes**

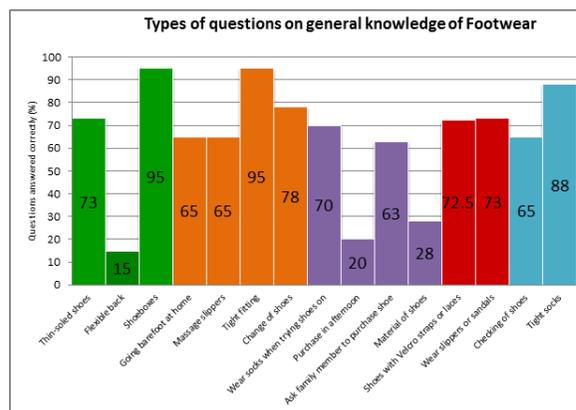
A relatively large number of patients (35%) did not have the common practice of checking each time before putting their shoes on. Many believe that they can feel if damage is present in their shoes, thus removing the need to check.

**Accessory items**

Patients are aware that socks should be carefully selected, with 88% of patients understanding that tight socks are best avoided.

**Common misconceptions**

The question on whether shoes should be tight fitting was very well answered, with 95% of respondents answering correctly. Many (78%) correctly understood that diabetics need to rotate between more than 1 pair of shoes, however 10% did not know how to answer and 13 % were wrong. It is also revealed that most patients (64%) wrongly believe that going barefoot at home is alright. Table 3 summarises the percentage of correct answers obtained for each question on Footwear:



**Table 3:** Chart showing performance on types of questions on general knowledge.

**Discussion**

Our study showed that patients typically have limited understanding on the kinds of shoes appropriate for diabetics. While 95% answered correctly that shoes with tight shoe boxes should be avoided, 28% answered the question on soles wrongly, and 85% answered the question on backs wrongly. For stability and comfort, shoes must be roomy, have a good heel for support, and have a cushionable sole [17]. The absence of holistic understanding on parts of footwear points to a deficiency in education by the health-care providers. More emphasis was therefore placed on each part of the shoe in the package.

80% of patients have the misconception that shoes should be purchased only when it is the most convenient for them, and are unaware that because feet swell and change sizes throughout the day, timing is an important consideration when trying on shoes. Proper footwear can protect the feet from injury, hence ensuring proper steps are taken to purchase appropriate shoes is critical. As such, more emphasis on how to select shoes was given in the education package.

Regular footwear inspection is infrequent amongst our patients, and done in only 65% our patients. These results are similar to the findings of other studies on footwear [18,19]. Regular footwear inspection can prevent unnecessary damage to feet due to loose objects or rough edges [17]. We have therefore recognised the importance of educating patients on how to regularly inspect and maintain their shoes.

A fairly high number of people agree to going barefoot at home (65%) despite it not being a recommended practice. Other studies have also produced comparable results, and patients also report going barefoot at home due to similar cultural reasons and a hot and humid climate [2]. Hence, special notice has been given to explaining and debunking this common misconception in the education package.

## Crafting Of Package

### Content

Our questionnaire revealed certain areas on footwear that most patients were relatively weaker in, as discussed above. Thereafter, we know to incorporate what we know our patients are poor at in creating our package, such that it can be relevant in addressing these gaps in information. Aspects of footwear—such as the selection of shoes, safety checks before putting shoes on, and common misconceptions have been awarded greater emphasis in our package.

### Format

Our package has a simple and clean layout, with colourful diagrams to illustrate each point to better capture the attention of our elderly patients.

To make the brochure easily readable, we presented all information in short sentences and used colourful pictures and diagrams to illustrate each point (refer to figure 3).



**Figure 3:** Sample page of patient education package.

## Limitations

### Small cohort size

Firstly, due to limited resources, the sample size of each patient cohort was  $n = 40$ , which is too small. Thus, this is only a pilot study. Further studies on larger cohorts of patients have to be performed to accurately determine the gaps in knowledge about footwear our patients have.

### Interviewer bias

Moreover, the interviews were conducted by multiple personnel, giving rise to the possibility of interviewer bias.

### Knowledge and actual practice

There also possibly exists the divorce between what patients know and actual practice. While patients may have sound theoretical knowledge and be able to answer questions on footwear, this may not translate into application in their lifestyle.

### Lack of evaluation

Further feedback from patients is required to evaluate the effectiveness and readability of the patient education package. A follow up study in the longer term should be done to test how much information patients can retain.

### Conclusions

In conclusion, given the importance of footwear in preventing ulceration in the diabetic foot, greater emphasis has to be placed on educating patients about proper types of footwear.

Our questionnaire has detected that our patients lack knowledge in certain areas of footwear, in particular, areas on how to select shoes, safety checks to perform before wearing shoes, and common misconceptions on footwear. Our education package has been specifically tailored to suit the needs of the local population—it covers all aspects of footwear to provide a holistic understanding, with added emphasis on weaker areas revealed by the questionnaire.

Moving forward, more large scale studies have to be performed obtain more accurate data representative of the diabetic population in Singapore. We believe that the combination of lifestyle habits and appropriate footwear as enabled by a good education package, can play a significant role in ensuring healthy feet in high-risk people with diabetes.

### Conflict Of Interest and Funding

The authors have not received any funding or benefits from industry to conduct this study.

### References

1. Hughes K, *et al.* "Central obesity, insulin resistance, syndrome X, lipoprotein(a), and cardiovascular risk in Indians, Malays, and Chinese in Singapore". *Journal of Epidemiology & Community Health* 51.4 (1997): 394-399.
2. Saurabh S., *et al.* "Effectiveness of foot care education among people with type 2 diabetes in rural Puducherry, India". *Indian Journal of Endocrinology and Metabolism* 18.1 (2014): 106-110.
3. American Diabetes Association. "Consensus Development. Conference on Diabetic Foot Wound Care". *Diabetes Care* 22.8 (1999): 1354.
4. Palumbo PJ., *et al.* "Peripheral vascular disease and diabetes". *Diabetes In America* (1985): 1-21.
5. Pham HT, *et al.* "Screening techniques to identify the at risk patients for developing diabetic foot ulcers in a prospective multi-center trial". *Diabetes Care* 23.5 (2000): 606-611.
6. Diabetes Singapore. "Diabetes and Infection [Brochure]". Location: Singapore (2009).
7. Hux JE, Jacka R, Rothwell D, Fung K. Diabetes and peripheral vascular disease. In: Hux JE, Booth GL, Slaughter P, Laupacis A, editors. *Diabetes in Ontario: An ICES Practice Atlas*. Toronto: Institute for Clinical Evaluative Sciences [2003] p. 129–50.
8. Pecoraro RE., *et al.* "Pathways to diabetic limb amputation: Basis for prevention". *Diabetes Care* 13.5 (1990): 513-21.
9. Larsson J., *et al.* "Stenstrom A. Local signs and symptoms in relation to final amputation level in diabetic patients". *Acta Orthopaedica Scandinavica* 65.4 (1994): 387-93.
10. Uccioli L., *et al.* "Manufactured shoes in the prevention of diabetic foot ulcers". *Diabetes Care* 18.10 (1995): 1376-78.
11. Diabetes Foot Care Questionnaire. (n.d.). Retrieved May 19, 2014
12. Dixit S., *et al.* "A questionnaire based survey on awareness of diabetic foot care in Indian population with diabetes: A cross-sectional multicentre study". *Indian Journal of Medical Sciences* 65 (2011): 411-23.
13. Gondal M., *et al.* "Evaluation of knowledge and practices of foot care in patients with chronic type 2 Diabetes Mellitus". *Journal of Postgraduate Medical Institute* 21.2 (2007): 104-8.

14. Chandalia H. "Footwear and foot care knowledge as risk factors for foot problems in Indian diabetics". *International Journal of Diabetes in Developing Countries* 28.4 (2008): 109-113.
15. Colagiuri R. "Development and validation of a diabetes knowledge questionnaire". *Practical Diabetes International* 28.4 (2011): 166-170.
16. Garcia AA., *et al.* "The Starr County Diabetes Education Study: Development of the Spanish-language diabetes knowledge questionnaire". *Diabetes Care* 24.1 (2001): 16-21.
17. Thomson, E. (2011, June 29). Foot Care for People with Diabetes: Foot Examination, Shoe Selection, and More. WebMD. Retrieved May 19, 2014.
18. Desalu OO., *et al.* "Diabetic foot care: Self-reported knowledge and practice among patients attending three tertiary hospital in Nigeria". *Ghana Medical Journal* 45.2 (2011): 60-5.
19. Al-Khaldi YM. "Foot care among male diabetics in family practice center, Abha, Saudi Arabia". *Journal of Family and Community Medicine* 15 (2008): 103-6.