

Patient Education on Foot Care for Patients with Diabetic Foot Problems

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Abstract

Introduction: Diabetic patients are at an especially high risk of developing foot problems and ulceration. The objective is to find out the amount of knowledge diabetic patients have on the risks they are exposed to, and how they can take measures to reduce such risks.

Materials and Methods: A survey questionnaire has been designed to cover all aspects of diabetic foot care including foot hygiene, skin care, nail care, first aid, inspection of the foot and common foot problems in diabetics. A pilot study was done on 40 patients with diabetic foot problems using the questionnaire. An education package on diabetic foot care was produced to cover common loopholes in patient knowledge based on the survey results. The package was distributed among diabetic patients to educate them more about proper care of the feet.

Results: A total of 40 subjects were interviewed. The mean score among patients is 15.6 out of 21. The "correct answer" percentages for individual questions from each section ranges from 40% to 95% (hygiene), from 37.5% to 92.5% (skin care), from 32.5% to 95% (nail care), from 20% to 100% (inspection of the foot), 92.5% (first aid) and from 65% to 90% (common misconceptions in diabetic foot).

Conclusion: Diabetic patients did not have as much knowledge on diabetic foot care as would be desirable. The education package addressing all gaps is written in a simple and concise manner, with ample illustrations.

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Introduction

Foot Problems in Diabetic Patients

Diabetic patients are at an especially high risk of developing foot problems. Common foot problems in diabetics include cellulitis, abscess, wet or dry gangrene, ulcer, osteomyelitis, septic arthritis, necrotizing fasciitis and Charcot Joint Disease [1].

Clinical Significance of Research Project

The consequences resulting from foot ulceration in diabetics are grave and severe, with most often leading to lower limb amputations in diabetics. Lower limb amputation rates for diabetics are alarmingly higher than that of normal people. Every 30 seconds around the

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world, a lower limb is lost due to diabetes [2]. Moreover, 70% of patients with major amputations die within the next five years [2]. The amputation rates are also 40 times higher in diabetic patients than in normal people [2]. In addition, it was discovered that 50% of all leg amputations are due to diabetes [2]. In Singapore itself, about 700 amputations of the lower limb are performed annually on diabetic patients with foot problems [1].

Lower limb amputations can be avoided with proper foot care and early treatment. Patient education allows one to take preventive measures before further complications develop and is important for diabetic patients to better manage their condition [3]. The development of an education package on proper foot care may help avoid many preventable amputations in diabetic patients.

A preliminary literature review has shown that many studies of date on patient education focus on the general care of diabetes [4-7]. At best, some studies like "The Diabetes Education Study: A Controlled Trial of the Effects of Diabetes Patient Education" by Mazzuca, *et al.* [4] and "The summary of diabetes self-care activities measure" by Toobert, *et al.* [7] covered a little on foot care, though the overall emphasis was still on general diabetic knowledge.

Little has been researched on the extent of knowledge patients have on the appropriate care of their feet. This study will show how much knowledge patients have on care of the foot. A survey questionnaire was used to determine the extent of patient knowledge on foot care. An education programme, consisting of an education package on foot care, was carefully designed and tailored to meet the needs of patients on foot care.

Specific Objectives of Research Project

There are two main objectives of this project. The first is to produce a survey questionnaire for assessing knowledge of patients on diabetic foot care. The second is to produce an education package on foot care for patients with diabetic foot problems.

Materials and Methods

The pilot study was split into three main sections-designing a survey questionnaire, conducting the survey on diabetic patients with foot problems to assess patient knowledge and developing an education package on foot care which covers the main gaps in patient knowledge.

Designing the Survey Questionnaire

The first step of the research project was to design a questionnaire to test the knowledge of diabetic patients on foot care. Previous literature on survey questionnaires on diabetes was evaluated. It was found that most were generally limited to general care of diabetes [8-10]. At best, questionnaires tended to combine both aspects of foot wear and foot care [10] or there were very few questions on foot care [11]. While such questionnaires were conducted in areas like Nigeria [10] and Iran [12], there were no survey questionnaires on foot care in Singapore designed to assess amount of knowledge Singaporean patients have on foot care.

Thus, the questionnaire improved from previous questionnaires by narrowing the scope and focus of topics asked. The questionnaire designed is focused on foot care. It has been formulated to cover all aspects of foot care essential for diabetic patients to know. This ensures that patients have all relevant knowledge required to take care of their foot properly. There were 3 questions on hygiene, 4 questions on skin care, 1 question on first aid, 3 questions on nail care, 5 questions on inspection of the foot and 5 additional questions on common misconceptions and problems in diabetic patients. This spread of questions ensures that the questionnaire is structured and balanced.

The questionnaire (Table 1) also retained features proven effective in previous questionnaires. This included the multiple-choice format as well as having an "I don't know" option. Having an "I don't know" option helps to reduce ambiguity as to whether patients really knew the answer to a certain question or whether they were just guessing when answering a question they were not familiar with. Questionnaires were also written in a simple and concise manner to ensure that patients could easily understand the knowledge being asked of them.

Hygiene

- Diabetic patients need to dry thoroughly between their toes using a clean towel

Yes, No, I don't know

- Diabetic patients should wash their feet daily and leave them to air dry

Yes, No, I don't know

- Diabetic patients should use foot powder in between toes

Yes, No, I don't know

Skin care

- Diabetic patients should use moisturising lotion on dry areas of their feet

Yes, No, I don't know

- Diabetic patients should use moisturizing lotion between their toes

Yes, No, I don't know

- Calluses on the foot should be cut off with scissors or nailclippers

Yes, No, I don't know

- Diabetic feet tend to be dry.

Yes, No, I don't know

First Aid

- A sign of foot infection is a red, hot and swollen foot.

Yes, No, I don't know

Nailcare

- Toenails can be left long .

Yes, No, I don't know

- Ingrown toenails can cause infections of the foot

Yes, No, I don't know

- Toenails should be cut curved.

Yes, No, I don't know

Inspection of foot

- Diabetics must check their feet daily

Yes, No, I don't know

- Diabetic patients should get their feet examined by a healthcare professional:

Once every three months, Once every six months, Once a year, I don't know

- It is important to inform the doctor or podiatrist regarding cuts, blisters, abrasions, corns, calluses or changes in colour of the feet .

Yes, No, I don't know

- You should use a mirror to look at the sole of your foot.

Yes, No, I don't know

- What is the best way to take care of your foot?

- o Soak them in water for one hour a day
- o Rub your feet with alcohol everyday
- o Look at your feet and wash and dry them everyday
- o Buy large shoe

Common foot problems in diabetics

- Diabetics may develop numbness in their feet.

Yes, No, I don't know

- Diabetic patients with numbness are prone to having foot ulcers.

Yes, No, I don't know

- My foot problems are not serious because they are painless.
Yes, No, I don't know
- Diabetic wounds heal faster because of the increased sugar levels
Yes, No, I don't know
- You should test water temperature by putting your foot in it .
Yes, No, I don't know

Table 1: Survey Questionnaire.

Execution of Survey

The survey was a randomized pilot study conducted in the National University Hospital, Singapore over a period of 70 days from 26 February 2014 to 6 May 2014. The survey was conducted on 40 diabetic patients with foot problems, under the care of the National University Hospital Diabetic Foot Team, headed by senior author Aziz Nather. The patients surveyed either had Type I or Type II diabetes, with an age range from 29 to 72. The mean age of the patients interviewed is 51.4.

Patients were interviewed using the questionnaire to assess the extent of diabetic patient knowledge on foot care. Each correct answer is awarded one point. Each wrong answer or a question which the patient does not know how to answer is awarded zero points. The maximum possible score for the survey was 21. Patients who chose to complete the survey on their own were allowed to do so. The authors were conversant in English only.

Designing the Education Package

A preliminary literature review of existing pamphlets related to the research area on foot care was carried out. These include "Taking Care of Your Feet Patient Education Guide" by the National Healthcare Group, supported by National University Hospital and Alexandra Health [13] and "A Patient Education Guide to Taking Care of Your Feet" produced by the National Healthcare Group: Diabetes Foot Problems Workgroup [14].

Loopholes in previous pamphlets were identified and evaluated. Previous pamphlets tended to combine aspects of foot care and foot wear. While related, both foot care and footwear have enough scope to each be covered on its own. The education package is more focused on foot care and it has a comprehensive syllabus that will provide more specific and detailed information on foot care that diabetics need to know.

Existing pamphlets presented all information in four different languages within a single page, and condensed many pictures into a small space [14]. This resulted in the pamphlet looking cluttered, and may make it difficult for patients to assimilate information. In the report "Cutting Clutter: Combating clutter in annual reports", the Financial Reporting Council [15] showed that clutter tended to "obscure important information" and "undermines usefulness" of reports. The education package addressed these gaps in the package and worked on areas which patients were weak in, as assessed by the survey questionnaire.

Materials and Methods

A total of 40 subjects were interviewed. All were diabetic patients with foot problems. The average age of this pilot study population was 51.4 years old. Majority of the respondents received at least secondary education. The average total score of patients was 15.6. The highest score obtained was 20 and the lowest was 12. Figure 1 shows a breakdown of the individual results for each question.

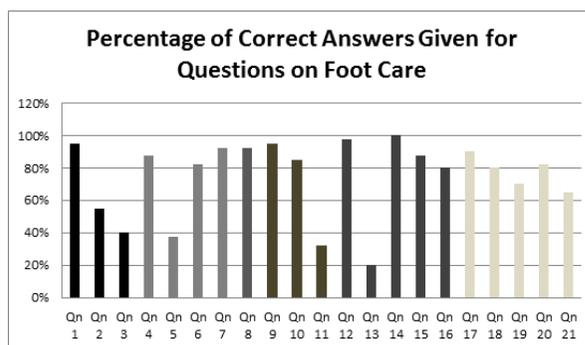


Figure 1: Percentage of Correct Answers Given for Questions on Diabetic Foot Care.

Hygiene

Respondents were most poorly informed on the negative impact of using foot powder between the toes (Qn 3). Only 40% knew that foot powder should not be used between the toes. For those who gave incorrect answers for Q3, most chose "Yes" (47.5%). Respondents were most informed of the need to dry between the toes using a clean towel (Qn 1), with 95% choosing the correct answer.

Skin Care

Most patients generally understood that diabetic feet tend to be dry (Qn 7) with 92.5% answering correctly. The question answered most poorly (Qn 5) involved whether patients should use moisturising lotion between the toes. Only 37.5% answered this question correctly, by responding that moisturising lotion cannot be used between the toes.

First Aid

Only one question (Qn 8) was tested on first aid. This assessed whether patients knew what the warning signs for a foot infection was. 92.5% of the population was able to correctly answer this question.

Nail care

Under this section, most patients (95%) showed an awareness that toenails should not be left long (Qn 9). However, most patients were not aware of the proper way of cutting their toenails (Qn 11). A handful admitted that they did not know how to cut their toes properly (10%) and some even argued that the way the toenail is cut is irrelevant. A substantial portion (57.5%) of the respondents argued that toenails should be cut curved and only a mere 32.5% of the population gave the correct answer that toenails should be cut straight across.

Inspection of Feet

This section consisted of most the best done as well as the most poorly done question in the entire questionnaire.

100% of all patients knew that they had to inform doctors of any significant new problems such as cuts, blisters or calluses on their feet (Qn 14). 97.5% of patients also knew the importance of checking their feet daily to check for any problems (Qn 12).

However, only 20% of the population surveyed answered the question correctly (once a year). 30% believed that they should visit the doctor every three months, while 27.5% believed that a check-up should be done once every six months. The remaining 22.5% did not know the answer to the question. This is an area that has to be addressed and made known to patients in the education package.

Common Foot Problems in Diabetics

This section had 5 questions which aimed to clarify common misconceptions diabetics may have on foot care. It was relatively well done.

Most patients (90%) knew that numbness in the feet could develop in diabetics (Qn 17). However, only 65% were able to correctly identify that they should not use their foot to test for water temperature due to problems with sensation in the feet, as this may lead to burns. The remaining 35% of the cohort thought it possible to use one's feet to test for water. (Qn 20) Hence, it is important to ensure that patients can make use of scientific facts in real-life applications to prevent accidents from occurring in day-to-day life. This is an area that will be addressed in the education package.

Discussion

The average score obtained by patients obtained on the questionnaire was 15.6. This shows that while patients have a reasonable amount of knowledge on foot care, there is still room for improvement.

The most poorly done questions in the questionnaire were questions 2, 3, 5, 11 and 13. The high number of incorrect responses for question 2 may have been because many patients had the misconception that washing one's feet enough and there was no need to towel dry one's feet. Similarly, many patients may have answered questions 3 and 5 incorrectly as they may not have the misconception that since it is fine to use foot powder and moisturizing lotion on dry areas of the feet, this can be extended to areas between the toes as well.

However, it is important that patients use a clean towel to dry the feet, especially between the toes. If spaces between the toes are not properly dried, it may lead to skin maceration. This causes a break in the skin and provides opportunities for fungal and bacterial infections [1].

Using foot powder in between the toes may also lead to skin abrasions and ulcerations as foot powder may adhere to moist areas, forming clumps. Moisturizing lotion should not be used between the toes as it may also cause maceration [1].

Toenails are an aspect often neglected by patients. Many deem it unimportant in the care of the foot, and do not believe that the way one cuts one's toenails has any impact on the foot. This led to the poor response as seen in question 11. Most patients thought it irrelevant cut straight or curved, and a significant 57.5% believed that toenails should be cut curved. Toenails should be cut straight across to prevent the development of ingrown toenails, which may cause foot infections.

Many patients were also unclear or undecided as to how often they should visit a healthcare professional. Some felt that there was no need for routine check-ups and that one need only visit a doctor for feet examinations when problems occur. Only 20% were aware that they needed to visit a doctor for feet examinations once a year. Many may find it pointless to go for a routine feet screening when there seems to be no foot problems as they may deem it to be a waste of money and time.

However, it is important for patients to have routine visits and check-ups with doctors to pick up any foot problems that may arise at an early stage, so that the doctor can prescribe necessary measures to be taken to prevent further problems from developing. A study performed by McInnes, *et al.* [16] substantiate this point, arguing that while many patients do not see the importance of regular annual foot examinations, such screening is often necessary for proper care of the foot.

Research by Tham, *et al.* [17] show that understanding the basis of various treatment measures enable about half of the patients to change their habits for the better. As such, a comprehensive package is useful to effect change in patient behavior.

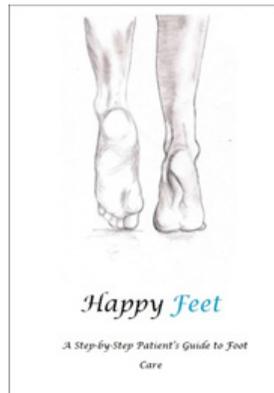


Figure 2: Happy Feet- A Step-by-Step Patient's Guide to Foot Care.

The education package, entitled “Happy Feet” provides a step by step guide on care for the foot (Figure 2). Pictures are provided at the side. These serve as visual illustrations on how to properly take care of one’s foot. The package is broken up into five parts, namely hygiene, skin care, nail care, first aid and inspection of the foot. These five sections are all essential for the complete and thorough care of the foot in diabetic patients (Figures 3a, 3b). This provides a comprehensive guide for patients, including all essential details for complete care of the feet.

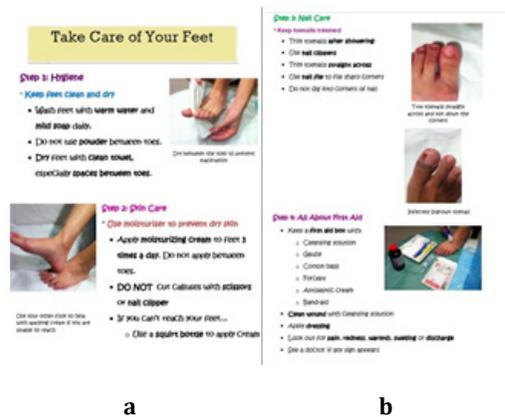


Figure 3a & 3b: Happy Feet- A Step-by-Step Patient's Guide to Foot Care.

This ensured that relevant information that most diabetic patients missed out on foot care as evaluated by our survey questionnaire were included in the education package. The education package also built up on the strengths of previous packages and improved on previous packages to provide a holistic breadth and depth on foot care in a manner easily understood by the layman.

These points are reinforced again at the end of the booklet with a simple checklist. The checklist provides an overall summary of the essential points that patients need to remember, reinforcing the key features patients have to take note of in foot care.

In the section on common foot problems faced by diabetics, most patients demonstrated understanding that diabetes may result in numbness in the feet. However, they were unable to transfer this understanding to real-life applications. This is seen by the much poorer response when asked whether diabetics should test water temperature using their feet. As diabetics may suffer from neuropathy, this is generally not advised as it may result in burns without the patient realizing it.

As such, it is important to ensure that knowledge patients have on facts about diabetic foot care can be transferred to real-life applications as well. This is why the package has a section on tips to keep one's feet healthy when on holiday to provide a practical guide on foot care that is easily applicable to day-to-day situations (Figures 4a, 4b).

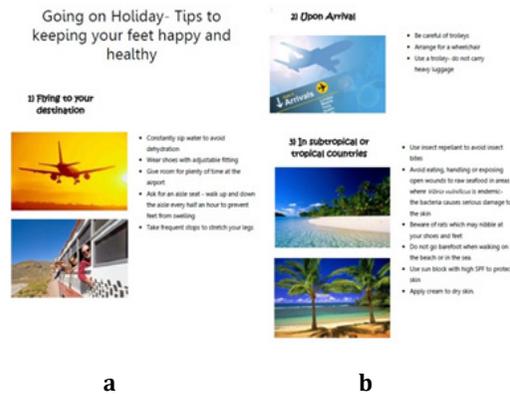


Figure 4a & 4b: Going on Holiday- Tips to keeping your feet happy and healthy.

Overall, the education package focused on the main gaps in patient knowledge as assessed by the survey questionnaire. It also improved on previous packages and added in details neglected in previous packages.

Potential Limitations of Study

The cohort size tends towards the small side, with only a cohort size of 40. Hence, results obtained may not be representative of the entire diabetic population. There may be language difficulties as the initial education package was printed only in English. This limits the scope of patients that could have been assessed. It also limited and excluded patients who were illiterate and could not read English.

Clinical Implications and Potential Applications of Research

The survey questionnaire revealed various gaps in patient knowledge on diabetic foot care. This enabled an education package that addressed such gaps to be designed, in order to enable diabetic patients to be better informed on how to take care of their feet.

A potential extension of the study would be to look at whether care of the foot by patients improved post-education, rather than just assessing patient knowledge alone.

Conclusions

Our survey questionnaire revealed that diabetic patients did not have as much knowledge on diabetic foot care as would be desirable.

Gaps in knowledge include how often they should visit a healthcare professional for feet examinations, the use of foot powder and moisturising lotion between the toes, the proper method for cutting one's toenails as well as using the foot to test for water temperature.

This education package designed addressing all gaps is written in a simple and concise manner, with ample illustrations. The guide is easy to read by patients. By understanding the principles of foot care, patients will then be able to change their habits and practices.

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