



Self-Care among Diabetic Amputee

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Abstract

Background: Diabetic amputees are at increased risk for receiving a second amputation, which may be prevented by proper self-care. Although existing literature suggests self-care is inadequate among diabetic patients, self-care behaviour after an amputation is unknown. This study aims to identify strategies used by diabetic patients who received a lower-extremity amputation to prevent further amputation.

Method: A cross-sectional survey was conducted on patients over 18 years of age who were registered at a tertiary academic health centre from January to March 2013 and who received a unilateral lower limb amputation after being diagnosed with diabetes. A 26-question self-administered questionnaire was used to obtain information on demographic and clinical characteristics as well as foot care, lifestyle modifications, and compliance with medication and blood glucose monitoring.

Results: Ten patients participated in this study, all of whom had type II diabetes and received an amputation at or above the ankle. Half of the participants checked their feet on a daily basis within the past week, and 30% inspected inside their shoe and washed their foot every day in the past week. 90% of participants had their feet examined by a healthcare professional within the past year, and 30% participated in a Diabetes Education Program. All patients took the recommended medication for their diabetes daily and 80% monitored their blood sugar daily within the past week. 30% followed their eating plan every day, and 40% participated in the recommended level of physical activities daily.

Conclusion: Overall, compliance with foot care was poor among diabetic amputees. Adherence to eating plan and regular physical activity was also low. Healthcare providers should improve self-care among diabetic amputees through various education methods.

Keywords

Diabetes, Amputation, Self-care, Foot care

risk factor for re-amputation of the same limb [2,3]. Amputation has life-long negative impact on functional independence, psychological health, and quality of life [4,5]. Most foot ulceration and amputation can be prevented by proper care [6-8]. Once a lower extremity amputation was performed, effort should be made to ensure that the both limbs are monitored and managed appropriately [9]. According to the Canadian Diabetes Association's Clinical Practice Guidelines [10], for patients who had a prior amputation, proper foot care should include daily feet inspection, regular washing of feet with careful drying, checking inside of shoes for pressure points or foreign objects, and therapeutic shoe wear to reduce plantar pressure and accommodate foot deformity. Foot examinations should also be performed by healthcare providers more than once a year for those who had prior foot ulceration. In addition, proper shoe wear may help prevent against amputation [11]. Furthermore, proper diabetic care and glycemic control strategies, which includes healthy eating, regular physical exercises, quitting smoking, adhering to proper medication, and regular glucose monitoring, may help prevent neuropathy and peripheral vascular disease which lead to additional foot ulcers and amputations [12,13].

Existing studies suggest foot care among diabetic patients is inadequate and additional effort is required. A survey found that 7 in 10 Canadians living with diabetes do not examine their feet on a daily basis, and 4 in 10 reported having their feet examined by a doctor less than once a year, only when something is wrong, or never [14]. Similarly, among Canadian patients who received a lower-extremity amputation, 61% reported they not have daily inspection of their feet prior to amputation, 52% reported never checking inside their shoes or socks, and 42% had their feet checked by healthcare professionals more than a year ago [15]. Among Canadian patients with diabetes, nearly half were not at target blood glucose levels [16]. Approximately 70% of patients were not applied with dietary modifications and physical exercises. However, there's a lack of literature examining self-care behavior among diabetic patients after an amputation [17].

This study aims to identify strategies used by diabetic patients who received a lower extremity amputation to prevent further amputation. Preventative strategies include appropriate foot care as well as general diabetes care. By gauging the adequacy of self-care and postoperative clinic follow-up, the academic centre can measure the need for improvement in services, and create new education programs as necessary. Research results will also provide the context

Background

Diabetes is a severe disease with multiple complications, including foot ulcers and amputations. 15% of Canadians who have diabetes will have a foot ulcer in their life time, of whom 15-25% will require a lower extremity foot amputation [1]. More than half of Canadian patients with a first amputation will have a second limb amputated in five years. Amputation has also been identified as an independent

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Table 1: Demographic Characteristics

Age	Sex	BMI	Married	Home	Education	Income
61 (33-82)	8 M (80%)	32 (24-43)	Single 5 (50%)	With Family -8 (80%)	High School/less -4 (40%)	0-\$19,000-8 (80%)
	2 F (20%)		Married 5 (50%)	Single-2 (20%)	College -3 (30%)	\$20,000-\$70,000-2 (20%)
					University-3 (30%)	

Table 2: Diabetes and Amputation Characteristics

Type	Time since Diagnosis- Years	Time since Amputation- Years	Time between Diagnosis and Amputation-Years	Site Amputation	Side of Surgery
Type 1-0	17(3-40)	3 (1-9)	14 (0-38)	Lower leg including ankle-9 (90%)	Right -8 (80%)
Type 2-10				Upper leg including knee-1 (10%)	Left -2 (20%)

Table 3: Utilization of Recommended Foot Care Strategies in the Past Week

Foot Strategy	7 Days	4-6 Days	1-3 Days	0 Days
Check feet	5	2	1	2
Inspect Inside Shoes	3	0	3	4
Wash Feet	3	0	4	2
Dry Toes after Washing	3	0	4	2

Table 4: Utilization of Other Foot Care Strategies

Wearing Prescribed Shoes	Wearing Socks	Foot Exam Past Year by MD	Foot Care Education
Yes 5-(50%)	Yes 4- (40%)	Never 1-(10%)	Diabetes Education -0 (0%)
No 5 (50%)	No -6 (60%)	Once 0- (0%)	Information from MD-6 (60%)
		Twice 3-(30%)	Both 3-(30%)
		>2 Times 6 (60%)	None 1- (10%)

for future studies to examine potential barriers to self-management post amputation, and lay the groundwork for similar studies of larger scales for this high-risk population. Existing literature suggests inadequate compliance with self-care among diabetic patients, including diabetic amputees prior to amputation. This trend may be similar in diabetic patients post amputation as they may continue to manage their care inappropriately. On the other hand, diabetic amputees may pay more attention to their care due to greater perception of disease severity or more education on self-care after the initial amputation. This study is explorative in nature and will reveal which of these hypotheses is correct.

Method

Eligible participants were patients registered at a tertiary academic health centre from January to March of 2013 who received a unilateral lower limb amputation after being diagnosed with any type of diabetes. Lower limb amputation can be divided into amputation of the toe(s), foot, lower leg (including ankle), or upper leg (including knee). Participants must be at least 18 years of age.

A cross-sectional survey was conducted to provide a descriptive overview of the preventative strategies employed by amputees against further amputation. Patients were recruited from Prosthetics and Pedorthist services, Amputee clinic, and Foot clinic at the academic institution. Convenience sampling was used due to the limited amount of time available and small population size. Pedorthists and physicians were asked to identify patients who had appointments the following week and who fulfilled the inclusion criteria. After consent was sought, participants were given paper-based self-administered questionnaires (Appendix 1), which offered anonymity and were time saving and inexpensive. Each questionnaire contained 26 questions, and included validated questions from Summary of Diabetic Self-Care Activities Measure [18]. Questions sought for information on demographic and clinical characteristics as well as foot care and general diabetes care. Completed questionnaires were returned to study personnel in sealed envelopes, and were stored in a secure, locked cabinet. Ethics approval was obtained from the academic center Research Ethics Board.

Results

Ten eligible participants were identified during the study

Table 5: Frequency of Utilization of Recommended Self-Care Strategies in the Past Week

Diabetes Management	7 days	4-6 days	1-3 Days	0 Days
Follow Eating Plan	3	3	2	1
Exercise > 30 Minutes	4	2	3	1
Monitor Blood Sugar	8	2	0	0
Compliance with Meds	10	0	0	0

period. 100% agreed to participate in the study. The mean age of participants was 61 (33, 82) years (Table 1). 80% of participants were male. 50% were single, and 80% were living with family. 80% had an annual income of \$0 - \$19,999. 60% of participants had college or university education. The mean Body Mass Index (BMI) was 32 (24, 43) kg/m². All participants had type II diabetes (Table 2). On average, participants were diagnosed with diabetes 17 (3, 40) years ago, and received a lower limb amputation 3 (1,9) years ago. The mean time between diagnosis and amputation was 14 years. 90% of participants had a lower leg amputation at or above the ankle, and 10% had an upper leg amputation including the knee. None of the participants had amputation of toe(s) or foot.80% of amputations was performed on the right leg. Half of the participants checked their feet on a daily basis within the past week (Table 3). Only 30% of participants inspected inside their shoes, and 40% never inspected inside their shoes within the past week. 30% of participants washed their feet everyday within the past week, all of whom dried their toes after washing. Half of the participants wore shoes prescribed by physicians and fitted by pedorthists, and 40% wore socks prescribed or recommended by physicians or pedorthists (Table 4). 90% of participants had their feet examined by a healthcare professional within the past year, and 60% had two or more exams in the past year. 90% of patients received some form of information from their healthcare providers about foot care, such as brochures and websites. 30% also participated in a formal Diabetes Education Program. All patients took the recommended medication for their diabetes daily within the past week (Table 5). 80% monitored their blood sugar every day within the past week, and 20% were compliant with blood sugar monitoring on at least four days in the past week. On the other hand, only 30% followed their eating plan every day, and only 40% participated in at least 30 minutes of physical activities (including walking) within the past week. 10% of participants never followed an eating plan and never participated in the recommended level of physical activities. 20% of participants were smokers, and on average smoked two cigarettes per day.

All the 10 patients need family members' help to do the foot management. The problem of vasculopathy and peripheral neuropathy is a major problem and therefore the need for regular foot care to prevent complications. All 10 patients had the problem of both vasculopathy and peripheral neuropathy.

This study was approved by the Academic Health Center Research Ethics Board without revisions through delegate review Informed consent were sought from eligible participants.

Discussion

Overall, compliance with foot care was poor among diabetic amputees. Patients failed to regularly check their feet, inspect inside their shoes, and wash their feet. Compliance was especially low for

inspecting inside shoes for foreign items and pressure points. Also, several patients failed to wear prescribed shoes or socks. In contrast, almost all patients had their feet examined by healthcare professionals at least once a year.

Though patients were compliant with taking medications and monitoring blood sugar they were not adherent to lifestyle modifications needed for diabetes control. Few of them followed eating plan and exercised regularly. This may be especially problematic since many patients were obese and therefore at increased risk for cardiovascular diseases in addition to complications of diabetes. Our findings on foot care and general diabetes care are similar to those of existing studies on diabetic patients [14-16,19,20]. Diabetic patients had equally poor foot care after and before an amputation. On the other hand, diabetic patients who received an amputation seemed to have their feet examined more regularly by healthcare professionals comparing to those who did not. Although the majority of patients received information on foot care from their healthcare providers, few participated in a Diabetes Education Program. Due to poor adherence to self-directed foot care, healthcare providers should refer and encourage patients to attend Diabetes Education Programs. Several studies demonstrated the effectiveness of Diabetes Self-Management.

Through interactive individual and group sessions, the program teaches patients to understand the role of self-care, improve adherence to self-management strategies, and learn to set realistic goals to fit their lifestyle. Interactive education methods have been shown to have higher effectiveness on patient behaviour comparing to didactic sessions [24]. Healthcare professionals should also ensure discussion of foot care and general diabetes self-management with a patient after an amputation, and repeat discussion of self-care at follow-up appointments. Literature suggests face-to-face education of self-care is more effective than other information delivery methods, and that the use of booster sessions improved clinical outcomes [24].

Our study had several limitations. The use of convenience sampling may introduce selection bias. Since patients were recruited at their healthcare appointments, they may be more prone to seeking care, and may have more regular interaction with healthcare professionals or pay closer attention to their conditions. This may have biased our results away from the null, meaning other diabetic amputees may be even less compliant with self-care and may have less regular foot exams by healthcare professionals. Similarly, the sample failed to include patients who received minor amputations such as those of toe(s) and foot, whose self-care behaviour may differ from that of patients who received major amputations of the leg. In addition, the cross sectional study design only captured a single time point, and was unable to gauge any variation in self-care behaviour over time. Lastly, the use of self-administered questionnaire may introduce errors, as some patients may fail to recall accurate frequencies of self-care behaviour, or misunderstand certain questions. To overcome these limitations, future studies should include multiple healthcare centers, and use random samples. Cohort studies that describe potential change in self-care behavior may also be conducted. In addition, qualitative as well as quantitative studies may be performed to explore potential barriers to self-management among diabetic amputees.

Conclusion

Overall, compliance with foot care was poor among diabetic amputees. Adherence to the eating plan and regular physical activity was also low. Healthcare providers should improve self-care among diabetic amputees through various education methods. This study is a small sample size and the hope is to expand the research and with research board approval to obtain a larger sample size. This was a pilot study to test the hypothesis that even after amputation or even potential risk of amputation there still exist a significant lack of attendance to proper foot care with an increased risk of further amputation and morbidity.

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Appendix 1

Diabetes Care Questionnaire

Please answer the following questions to the best of your abilities, and circle ONLY one answer for multiple choice questions.

1. Demographic information

- 1) How old are you? ___ years
- 2) What is your sex?
 - a) Male
 - b) Female
- 3) What is your weight? ___lb OR ___ kg
- 4) What is your height? ___ ft ___in OR ___ cm
- 5) What is your current marital status?
 - a) Single
 - b) Married
 - c) Divorced
- 6) What is your current living situation?
 - a) Live with family
 - b) Live alone
- 7) What's the highest level of education you have obtained?
 - a) High school or less
 - b) College
 - c) University
 - d) Graduate/Postgraduate degree
- 8) What is your annual income?
 - a) \$0 - \$19,999
 - b) \$20,000 - \$69,999
 - c) >= \$70,000

2. Diabetes information

- 1) What type of diabetes do you have?
 - a) Type 1 diabetes mellitus
 - b) Type 2 diabetes mellitus
 - c) Others
- 2) When were you diagnosed with diabetes? ___ year(s) ago
- 3) When did you receive an amputation? ___ year(s) ago
- 4) At which site did you receive the amputation?
 - a) One toe
 - b) More than one toe
 - c) Foot
 - d) Lower leg (including ankle)
 - e) Upper Leg (including knee)
- 5) On which side did you receive the surgery?
 - a) Right
 - b) Left
 - c) Both sides

3. Foot care

- 1) On how many of the last SEVEN DAYS did you (or your caregiver) check your feet?
0 1 2 3 4 5 6 7
- 2) On how many of the last SEVEN DAYS did you (or your caregiver) inspect the inside of your shoes?

0 1 2 3 4 5 6 7

- 3) On how many of the last SEVEN DAYS did you (or your caregiver) wash your feet?

0 1 2 3 4 5 6 7

- 4) On how many of the last SEVEN DAYS did you (or your caregiver) dry between your toes after washing?

0 1 2 3 4 5 6 7

- 5) Do you wear prescribed shoes given to you by a physician and fitted by a pedorthist?

a) Yes

b) No

- 6) Do you wear socks prescribed or recommended to you by a physician or pedorthist?

a) Yes

b) No

- 7) How often did you have your feet examined by your family physician or other

healthcare providers in the past 12 months?

a) Never

b) Once

c) Twice

d) More than twice

- 8) What type of education have you received on foot care after your amputation?

a) I attended an diabetes education program

b) I receive information from my healthcare provider (ex. brochure, website)

c) A and B

d) None

4. Diabetes care

- 1) On average, over the past month, how many DAYS PER WEEK have you followed your eating plan?

0 1 2 3 4 5 6 7

- 2) On how many of the last SEVEN days did you participate in at least 30 minutes of

physical activity? (Total minutes of continuous activity, including walking)

0 1 2 3 4 5 6 7

- 3) On how many of the last SEVEN DAYS did you test your blood sugar the number of

times recommended by your health care provider?

0 1 2 3 4 5 6 7

- 4) On how many of the last SEVEN DAYS did you take your recommended diabetes

medications?

0 1 2 3 4 5 6 7

- 5) Have you smoked a cigarette – even one puff – during the past SEVEN DAYS?

a) No

b) b) Yes. If yes, how many cigarettes did you smoke on an average day?