



An evaluation of the effectiveness of foot care education in rural clinics

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Abstract

Purpose Approximately 13.3% of Mississippi's adult population lives with diabetes, with a higher prevalence among racial, ethnic, and socioeconomic minorities. However, there is no recorded data regarding the effectiveness of education on foot ulcer prevention provided to patients in the rural clinic network. Future studies to evaluate the effectiveness of foot care education would benefit from a racially-, ethnically-, and socioeconomically-diverse education program.

Methods This study combined verbal and visual education tools to improve the acquisition of knowledge and measure the effectiveness of knowledge the diabetic type 2 patients retained. A convenience sample of patients ($N=9$) completed pre- and post-intervention questionnaires. A convenience sample of the clinic's nurses ($N=4$) completed only a pre-intervention questionnaire. Data collection for this project included a 5-min formative one-on-one interview, pre- and post-test approach. The Statistical Package for the Social Science (SPSS) 20.0 was used to analyze the transcripts from the focus group, descriptive statistics from the demographic sheet, the questionnaire, and surveys.

Results Qualitative themes were used to evaluate the effectiveness of the program and to capture the participants' perception of their experiences. Descriptive statistics were used to analyze the demographic data and the knowledge retained. Variables were calculated using central tendency of mean, median, and mode. Satisfaction score with the education provided yielded a mean of 4.56 and standard deviation (SD) of .527.

Conclusions Detailed prospective research is required to determine if implementing education early in the patient's plan of care will improve the patient's overall health care status thus, decreasing facility costs.

Keywords Diabetes type 2 · Diabetes education · Basic foot care · Diabetic foot ulcers

Diabetes is an incurable disease that affects multiple organ systems when not therapeutically managed. Marked high levels of blood glucose create a cluster of symptoms known as diabetes mellitus (DM). Long-term micro/macrovacular and neurologic complications cause morbidity and mortality in patients with type 2 diabetes mellitus. As a result, diabetes is one of the most frequently diagnosed metabolic disorders and is currently at a pandemic magnitude. In 2016, the Centers for Disease Control and Prevention (CDC) estimated 29.1 million Americans, or 9.3% of the population, lives with diabetes. Of this number, 21.0 million have a diagnosis of diabetes, and 8.1 million are estimated to be undiagnosed [4].

Because of the high prevalence of diabetes, the perceptions of risk factors and healthy, self-care behaviors are important. In 2013, diabetes contributed to the deaths of 1069 Mississippians, and 292,662 of those affected, continue to live with life-limiting and life-threatening complications of diabetes daily [11]. The significant rise in the number of people affected by diabetes and insufficient healthcare resources makes it increasingly necessary to provide education to prevent diabetic foot complications.

Currently, foot care education targets patients with pre-existing complications of the foot and lower extremities. There is minimal, or no education provided on basic foot care or the prevention of foot ulcerations. Even though diabetic foot complications develop quickly, most primary care providers consider foot health education as costly and opt out on consistently providing education. If provided effectively and consistently, preventative patient-centered, prophylactic foot care decreases patient morbidity, the utilization of expensive

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resources, and the risk for amputation [1]. Jeffcoate et al. [7] found that daily foot inspection was the most common preventative measure in the prevention of foot ulcerations. The poor socioeconomic conditions, lack of proper diabetic foot care education, and incorrect footwear are factors associated with the development of diabetic foot ulcers.

The central purpose of diabetes self-management education is to help patients make knowledgeable healthcare decisions and to define their self-care activities; thus, patient education on appropriate self-care has the potential to play a significant role in preventing foot complications. Orem's theory of self-care identifies internal and external factors that must be changed for type 2 diabetic patients to perform activities to maintain a healthy lifestyle. The self-care theory was also used to identify ways to provide supportive foot care education. When supportive foot care education was received, the patients were able to change conditions and behavioral outcomes that affected their ability to care for their feet and make better health decisions. Educating and training diabetic patients and their family members increased their knowledge of diabetic foot care and helped bridge the gap between knowledge and integration into daily activities.

Previous research showed that providing effective education to diabetic patients and their family members could help decrease the incidence of foot ulcer formation or wounding events to patients' lower extremities. Findings from a descriptive, correlation study measuring knowledge and foot care 126 subjects in Bangladesh, had a high-level mean ($M = 84.55$) of the total level of knowledge. All questions were basic foot care and personal hygiene related. The study revealed that there is a statistically significant positive low relationship between total knowledge and total foot care [3].

However, a study of 110 patients that were affected by diabetic foot disease showed that non-healing ulcers were present among 82.7% and amputations amounted to 38.2%. More than 50% of the study sample knew diabetic foot care principles, but the practice was sub-standard. There was a statistically significant difference between foot care knowledge and foot care practice scores ($p < 0.001$, $z = -8.151$); nevertheless, only 51% of the participants had not received diabetes education before the occurrence of foot complications [8].

A cross-sectional study in Nigeria proves that 30.1% had good knowledge and 10.2% had a good practice of diabetes foot care. Most of the patients (78.4%) with poor practice had poor knowledge of foot care. Regarding knowledge, 68.8% were unaware of the first thing to do when they had redness or bleeding between their toes. Sixty-one (61.4) percent were unaware of the importance of inspecting the inside of their shoes for objects. This study also highlights the association between poor knowledge and poor practice of foot care in diabetes patients [5].

The purpose of this study was to evaluate the effectiveness of providing basic foot education on increasing foot care knowledge among type 2 diabetic patients in a rural Mississippi clinic. The Context, Input, Process, and Product (CIPP) model for program evaluation was used to look at systematic ways to measure the effectiveness of the basic foot care education provided to patients within the wound care clinic. The objectives of this study were to 1) improve patients' knowledge of diabetic foot care; 2) improve overall foot health; 3) decrease direct and indirect diabetic costs; 4) improve the economic status of patients and the facility; 5) increase the opportunities for shared learning experiences; and 6) narrow the gap between knowledge and practice. Findings from this study will identify strategies to develop and implement interventions to educate patients about basic foot care techniques and decrease the incidence of diabetic foot ulcers.

Methods

Conceptual models

Knowles's adult learning theory and Orem's theory of self-care guided the design and plan for the education; while Stufflebeam's CIPP model of program evaluation and The National Standards for Diabetes Self-Management Education and Support (2017) guided the framework for implementing and measuring the effectiveness of the education. The focus of this study was the supportive-educative category of Orem's theory of nursing systems. The paradigm of poor, supportive-education in diabetes self-care is solely the patients' failure to make knowledgeable health care decisions. Patients are also unable to attain the knowledge required to perform daily activities. Failure to manage self-care activities increases patients' risks of poor health status as it relates to diabetes and its complications. Evaluation of the level of knowledge retained by patients is necessary to 1) measure the understanding of diabetic foot care by the patients, 2) measure the effectiveness of the education provided by nurses and providers, and ultimately, 3) increase patients' knowledge of prevention of diabetic foot ulcers.

Knowles' adult learning theory was selected to help guide the delivery of the education provided during the intervention. The education delivery supports the notion that patients learn best when treated as adults, and that the ultimate purpose of adult education is to empower individuals through the process of learning [2]. For this study, and for consistency with agency standards, the Context, Input, Process, and Product (CIPP) model and the DSMES standards evaluated the implementation of the evidence-based basic foot care education [9].

The context component of the CIPP model identified the patients' and healthcare providers' needs. The input evaluation component provided data used in recommending an

appropriate project that best addresses the identified program needs or strategy (i.e., evidence-based, easy readability, culturally and age appropriate foot care education). The next component, process evaluation, monitored the project implementation and assisted in the identification of potential procedural barriers and needs for project adjustments (e.g., socio-economic constraints, time constraints, availability of resources, staff buy-in). The last component of the CIPP model, product evaluation, measured, interpreted, and judged project outcomes as it related to effectiveness, significance, and participant satisfaction [9].

The basic foot care education module was based on the guidelines of National Standards for Diabetes Self-Management Education and Support (2017), The American Association of Diabetes Educators, and the National Institute of Health (NIH) (2014). This type module was ideal to meet the targeted population's need for easy readability, appropriateness for age, cultural, socio-economical, and the time constraints of the clinic visit. The foot care provided was informative and consistent with other rural health care settings and across DSMES programs nationally.

Setting and sample

This study was conducted using a convenience sample ($N = 9$) of type two diabetic patients who visited a wound care center in a rural Mississippi Delta Community and had previously completed a formal DSMES program. Ages ranged between 46 and 70 years with the median age of 56 years. Six (66.6%) of participants were female with a median of 80.5 years. Male participants made up 33.3% of the sample, with a median of 54 years. Among the total participants; the greatest number of participants was in the age group of 68–79 years (44.4%), followed by 44–55 years (33.3%), and 56–67 years (22.2%).

Most of the participants (55.5%) were married, and 44.5% were single or divorced. Most families had annual incomes ranging from \$30–\$49,000 (55.5%) and 44.4% had annual incomes less than or equal \$20,000–\$29,000. Occupation status revealed that 44.4% of the participants were disabled, 33.3% were unemployed, and 22.2% were retired. Of the participants, 57.1% lived with their spouses, 42.9% lived with their children, and 22.2% did not respond to the item. None of the participants had been hospitalized for complications of diabetes or had amputations. The participant's educational levels ranged from primary to higher education.

Inclusion criteria were: 1) female or male 2) documented completion of a formal diabetes self-management education program 3) a definitive diagnosis of type 2 diabetes for 6 months or more, and 4) one or more ulcers to the lower extremities (see Table 1). The population also consisted of 4 clinic nurses who were required to attend an information session related to the diabetic foot health education provided to participants. This study (Protocol # 13-07-0901) was

Table 1 Demographic characteristic of participants

| Variable | N | Percentage of sample |
|-------------------|---|----------------------|
| Gender | | |
| Male | 3 | 33.3 |
| Female | 6 | 66.7 |
| Education level | | |
| Below 12th grade | 3 | 33.3 |
| HS diploma/GED | 4 | 44.4 |
| College | 2 | 22.2 |
| Income | | |
| \$5000–\$99,999 | 1 | 11.1 |
| \$10,000–\$19,000 | 2 | 22.2 |
| \$20,000–\$29,000 | 1 | 11.1 |
| \$30,000–\$39,000 | 4 | 44.4 |
| \$40,000–49,000 | 1 | 11.1 |
| Total | 9 | 100.0 |

approved by The University of Southern Mississippi College Institutional Review Board.

Data collection

Data collection for this study included a 5-min, formative one-on-one group, pre-test- post-test approach using transcripts from the focus group, descriptive statistics from the demographic sheet, the Patient Interpretation of Neuropathy (PIN) questionnaire, the Diabetes Attitude Scale (DAS-3) and section III of the Diabetes Health Survey. All questionnaires were administered using pen and paper. The data collection process for this study lasted 4 weeks. The Diabetes Attitude Scale (DAS-3) administered to the clinic nurses before the beginning of the intervention determine the level of foot care knowledge the nurses possess and to foster a supportive attitude from the nursing staff. The DAS-3 was also used to measure the general diabetes-related attitudes of the nurses providing patient education and care to the patients within the clinic (Table 2).

Data sources

The frameworks for the evaluation of the study utilized The CIPP model of evaluation and the DSMES principles [1]. The Patient Interpretation of Neuropathy (PIN) questionnaire was selected to collect pre- and post-intervention data [10]. Section III of the Diabetes Health Survey was used to measure participants' satisfaction with the education provided during the intervention. The Diabetes Attitude Scale (DAS-3) was administered to the clinic nurses before the beginning of the intervention. This questionnaire was used to determine the level of foot care knowledge the nurses possess and to foster a supportive attitude from the nursing staff.

Table 2 PIN questionnaire results prior to intervention

| | Descriptive statistics | | | | |
|--|------------------------|-----|-----|------|----------------|
| | N | Min | Max | Mean | Std. deviation |
| Can examine feet daily | 9 | 1 | 5 | 3.44 | 1.424 |
| Can improve circulation | 9 | 1 | 5 | 3.44 | 1.236 |
| Can keep podiatrist appointments | 9 | 1 | 5 | 3.78 | 1.202 |
| Can choose shoes that fit my feet | 9 | 2 | 5 | 4.11 | .928 |
| Can moisturize feet regularly | 9 | 3 | 5 | 3.89 | .601 |
| Can have hard skin removed | 9 | 2 | 5 | 3.56 | 1.236 |
| Diabetes doctor prevent lost feeling | 9 | 1 | 4 | 3.22 | 1.093 |
| My GP prevent feet from getting worse | 9 | 1 | 4 | 2.89 | 1.167 |
| Nobody prevent feet from getting worse | 9 | 2 | 4 | 2.78 | .972 |
| I can prevent feet from getting worse | 9 | 2 | 5 | 3.11 | 1.269 |
| I can keep appointments w/diabetes doc | 9 | 1 | 5 | 3.89 | 1.269 |
| Good diabetes control prevents feet | 9 | 1 | 5 | 3.33 | 1.323 |
| Improve circulation can prevent | 9 | 2 | 4 | 3.11 | .928 |
| Can keep my GP appointments | 9 | 2 | 5 | 4.00 | .866 |
| I can keep my blood sugars controlled | 9 | 1 | 5 | 2.89 | 1.453 |
| I can prevent foot ulcers from occurring | 9 | 2 | 5 | 2.78 | 1.093 |
| Diabetes doctor can prevent foot ulcers | 9 | 2 | 4 | 2.56 | .882 |
| GP can prevent foot ulcers | 9 | 2 | 5 | 2.56 | 1.014 |
| Podiatrists prevent foot ulcers | 9 | 2 | 5 | 2.89 | 1.269 |
| Checking feet can prevent foot ulcers | 9 | 1 | 5 | 3.00 | 1.323 |
| Nobody can prevent foot ulcers | 9 | 1 | 4 | 2.67 | 1.225 |
| Seeing podiatrist prevent foot ulcers | 9 | 1 | 4 | 2.33 | .866 |
| Wearing shoes that fit prevent ulcers | 9 | 2 | 5 | 3.78 | .972 |
| Moisturizing feet prevent foot ulcers | 9 | 2 | 5 | 3.11 | 1.054 |
| Removing hard skin prevent foot ulcers | 9 | 1 | 4 | 2.78 | .972 |
| Valid N | 9 | | | | |

Baseline responses of participants ($n = 9$)

This basic foot care education module was based on the standards of National Standards for Diabetes Self-Management Education and Support (2017). The module was ideal to meet the targeted population's need for easy readability, appropriateness for age, cultural, socio-economical, and the time constraints of the clinic visit.

Procedure

Before the implementation of this intervention, all clinic nurses were required to attend a round-table discussion on the purpose of the study as it relates to the education currently provided during routine clinic visits. The nurses also received instructions on the study's expected outcomes. Each nurse was asked to provide recommendations for the development of methods of delivery of the basic foot care education. The clinic nurses were also required to complete the Diabetes Attitude Scale (DAS-3) before leaving the meeting room.

The attitude scale was used to help modify internal factors that may produce educational bias and data saturation.

During the first clinic visit, diabetes patients were confidentially approached to extend the offer to participate in the study. Each consenting participant was asked to complete informed consent, demographic sheet, and received an information sheet. Clinic appointments were not staggered or altered as the original appointment schedule was convenient for the clinic staff and the patients. It took approximately 2 weeks to recruit participants.

Once the selection of participants was complete, and before the implementation of the basic foot care module, participants were asked to complete the Patient Interpretation of Neuropathy (PIN) Questionnaire using pen and paper. All participants received a diabetic foot screen for loss of protective sensation and standard information provided by the facilitator. The information provided consisted of oral and written instructions on foot care and the prevention of foot complications associated with diabetes. The module's oral and written

instructions were based on standards from The American Diabetes Association, The American Association of Diabetes Educators, and the National Institute of Health's (NIH). The NIH's booklet and checklist for foot care were used as the visual aide and teaching guide during the intervention. The facilitator read the booklet to participants and demonstrated how to perform each self-check. The facilitator then encouraged a return demonstration and answered questions from the participants. For purposes of consistency for evaluation, the facilitator provided all demonstrations, verbal and written information.

Active participation was encouraged to help build self-confidence, facilitate self-care and enable participants to manage different care situations. The original education program consisted of six sessions. The education sessions were combined to offer three sessions to provide the education program within the normal amount of clinic visits. The order or content of each of each session was not altered. Specifically, the first and second sessions were combined to provide an introduction and overview of the diabetic foot and provide instructions and demonstrations on daily foot checks. The third and fourth sessions provided instructions and demonstrations on foot hygiene, skin and toenail care, shoe and sock selection, and the avoidance of temperature extremes. The fifth and sixth sessions provided instructions on diabetic foot complications to report to the healthcare provider. The two additional optional meetings for participants with missed appointments were obsolete due to patient compliance. Each session lasted approximately 15 min of the 45 min scheduled for each visit to the wound care clinic.

The sessions were a formative one-on-one interaction between the facilitator and the participants. Each exam room displayed the Sensation Pattern poster and the National Institute of Health's (2014) booklet and checklist [16]. After the completion of the didactic portion of the basic foot education module (review of the NIH booklet), the participants were asked to complete the second PIN questionnaire-using pen and paper.

One week after the completion of the second PIN questionnaire, the participants returned to the clinic to complete a satisfaction survey (section III of the Diabetes Health Survey) and attend a focus group. The responses were recorded during the focus group and later transcribed verbatim to identify common themes. The data was then analyzed and presented to the facility's stakeholders during a scheduled round-table discussion 1 week later. The evaluation of this study was based on data collected from the three tools and responses from the focus group [10].

Data analysis

The Statistical Package for the Social Science (SPSS) 20.0 was used to analyze the data. Variables were calculated using

central tendency of mean, median, and mode to measure frequency distributions and clarify patterns [14]. Descriptive statistics were used to analyze the demographic data as well as the knowledge retained. Mean scores, ranges, and percentages were calculated using frequency distribution. Mean scores of the individual items in the subscales were calculated for statistical purposes.

Additionally, graphs and tables were used to help present the results of the study. Transcripts were repeatedly read by the facilitator and cross-compared both during and after data collection to identify common themes. The analysis of qualitative and quantitative data provided a representation of the effects of basic foot education on the patient level of knowledge. One coder performed data analysis.

Results

Data from the pre-PIN questionnaire showed that of the total participants, (66.6%) agreed that foot ulcers resulted from not taking care of their feet. Of the 9 participants, 44.4% agreed that daily checking of their feet decreases the likelihood of ulcer formation (see Fig. 1). Most (88.9%) of the participants either agreed or strongly agreed that they were able to choose shoes that fit their feet, but only 66.6% knew that wearing shoes that fit prevent foot ulcers. Only 33.3% believed that moisturizing skin prevents ulcer formation. Of the 9 participants, only 44.4% believed that good diabetes and blood sugar control prevent lost or reduced feeling in their feet. Only 22.2% of the participants agree that they can prevent foot ulcers from occurring, while 66.6% either agreed or strongly agreed that foot ulcers and other complications were the results of poor medical care. In the subscale regarding symptoms, 77.8% ($M = 3.67$, $SD = 1$, $N = 9$) were unable to associate the inability to feel objects with their feet, the inability to differentiate between hot and cold, and the formation of foot ulcers to decreased circulation and nerve damage caused by diabetes (diabetes neuropathy). These participants associated these symptoms with age or denied having these symptoms altogether.

Post-intervention data from the PIN questionnaire revealed that 100% of participants agreed that foot ulcers are caused by not taking care of their feet. The number of participants that agreed or strongly agreed that checking their feet decreased the likelihood of foot ulcer formation increased from 44.4% to 77.8% (see Fig. 2). All of the participants could choose shoes that properly fit their feet and believed that wearing shoes that fit properly prevent foot ulcers from occurring. All the participants believed that moisturizing skin prevents ulcer formation. Of the 9 participants, 100% believed that diabetes and blood sugar control prevent lost or reduced feeling in their feet. All understood the importance of having hard skin removed from feet regularly.

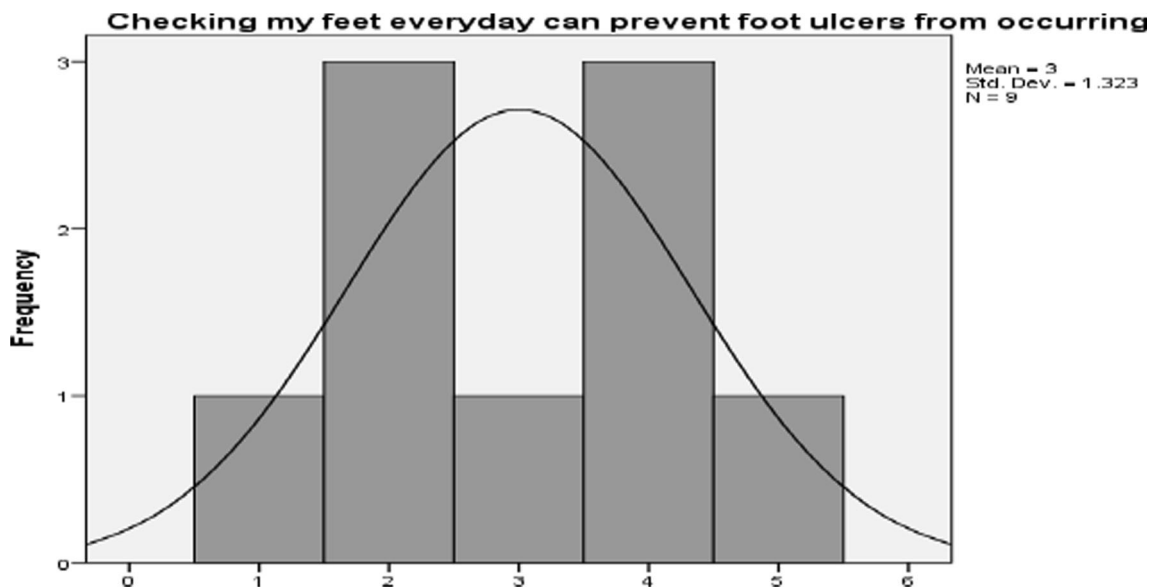


Fig. 1 Frequency Distribution of Checking Feet Daily Pre-PIN. Frequency distribution of checking feet daily. This chart shows the frequency, mean, and standard deviation of participants’ knowledge of

the importance of checking their feet every day in the prevention of foot ulcer formation based on the response from the pre-PIN questionnaire

In the subscale regarding symptoms, 100% of participants were able to associate the inability to differentiate between hot and cold to either poor circulation of nerve damage caused by diabetes. All (100%) of participants were able to associate the inability to feel objects with their feet to either poor circulation or nerve damage secondary to diabetes. A majority (88.9%) of participants were able to associate foot ulcer formation to poor circulation caused by diabetes, while 11.1% participants associated foot ulcer formation to an increase in age.

From the data collected during the focus group, the following themes emerged: Time (needed more time to talk to physician each visit); Listening (physician never tried to

understand what the patient was telling them; education was not patient-centered); Supportiveness (talk about what patients are doing right as well as what they can improve on); and Language (use language the patients understand but also positive language when providing care instruction). Based on themes gathered from the participants’ focus group, participants did not feel they were receiving the care necessary to manage their diabetes. The participants felt their concerns were not being heard and were willing to speak openly regarding the identified themes. The participants verbalized that the facilitator was more supportive than the primary doctor. Participants unanimously agreed that the supportiveness of

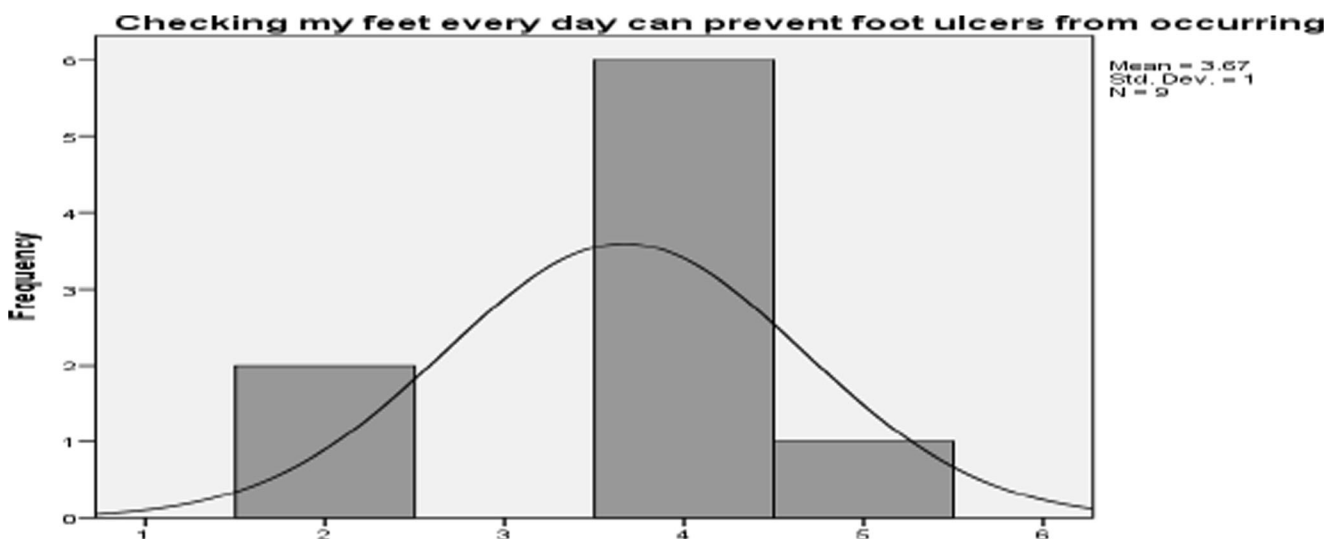


Fig. 2 Frequency Distribution of Checking Feet Daily Post-PIN. Frequency distribution of checking feet daily. This chart shows the frequency, mean, and standard deviation of participants’ knowledge of

the importance of checking their feet every day in the prevention of foot ulcer formation based on the response from the post-PIN questionnaire

the facilitator and effectiveness of the education synonymously enhanced the willingness to learn.

Discussion

Initially, this study was scheduled to consist of 6 lessons taught for a three-week period and consist of 5–6 participants. The participants were to complete a combined total of 12 h (1.33 h per participant) of education, and the education was to be completed within the first 15 min of the office visit. Due to changes in the clinical facility's organizational structure and time constraints placed on the evaluator by stakeholders, the study consisted of three lessons, 9 participants and 4 weeks of implementation. All participants received the same educational information.

During this intervention, there was a cumulative (percentage) increase in the amount of knowledge obtained from the education provided. Due to the size of the sample and the length of the education sessions, the data was not found statistically significant. However, the results of this study are consistent with the findings of other studies on the diabetic patient's lack of knowledge of foot care. This study looked at common descriptive characteristics identified by previous studies on knowledge of prevention of diabetic foot ulcers.

Regarding gender, most of the participants were women. However, the findings in this study were consistent with the findings of a national study that proved there was no significant difference (mean = 1.67, SD = .500) regarding the prevalence of poor foot care knowledge regarding gender [5]. The fact that women are the majority in the wound care clinic may have increased the probability female to male ratio in this study. Also, the fact that males are less likely to seek medical advice during an illness or engage in fewer health-promoting activities may have influenced the female to male ratio [13].

A quasi-experimental study of adults and elderly subjects by Otero et al. [12] revealed that of the 54 participants, knowledge regarding their primary disease increased significantly. The increase in knowledge was on general topics concerning diabetes mellitus. Like this study, the mean age of participants was 60 years, 74.1% were female, 68.5% were married, 42.6% were retired, and 59.3% had a history of incomplete primary education. This study did not show a significant difference in age and knowledge of diabetic foot care. In this study by Otero et al. [12] and similar studies, family support was a fundamental aspect of diabetic patients to achieve self-management. It was important for the caregivers to understand that knowledge about the disease was the basis to achieve diabetes self-management, but knowledge acquisition did not necessarily mean a change in behavior. Like Otero et al.'s [12] findings, this study showed a cumulative increase

in the knowledge on how to detect signs and symptoms of diabetes.

In a cross-sectional study of 352 diabetic patients, gaps in the knowledge and practice of foot care were visible. The study also underscored the need for an educational program designed to help reduce diabetic foot complications [5]. Patients with poor practice (78.4%) had poor knowledge of foot care. Some of the patients (61.4%) were unaware of the importance of inspecting the inside of their shoes for objects. A majority of the patients 89.2% failed to receive advice when purchasing shoes and, as a result, 88.6% failed to get the appropriate size shoes. This study proved that illiteracy and low socioeconomic status is significantly associated with poor knowledge and practice of foot care.

Because knowledge acquisition does not necessitate a change in health care behaviors, it is the responsibility of the health care provider to provide patients with all necessary information about their diabetes. The healthcare provider is also responsible for providing an in-depth explanation of planned care, and schedule frequent follow-up appointments. Participants thought that their diabetes health status would be improved if the healthcare provider would decrease the number of scheduled appointments to allow more time for discussion of issues. The themes from the focus group we were consistent with the findings from a study of 238 type 2 diabetic patients that were dissatisfied with the consultation time given by their treating providers. The study showed the providers could spare only a very limited amount of time for their patients. However, in that limited amount of time, the search for complications was ignored by most providers [15].

Participants from this study also felt that the wound care providers were slow to praise them for accomplishments but quick to ridicule them for their inability to meet the goals set by the provider. The participants were also concerned that the terminology and language the wound care providers used was hard for them to understand. When asked to elaborate more on the topic some participants verbalized the inability to understand the big words while others could not understand the dialect.

Despite the generalized geographical region, limited sample and time constraints, there were conclusive findings from the education program. For example, all participants in the intervention mean scores increased after the intervention. Patient satisfaction was measured via questionnaire after the education session. The overall score for satisfaction with the education provided had a mean of 4.56 and SD of .527.

Data from the DAS-3 proved that staff nurses strongly agreed that what the patient does have more effect on the outcome of diabetes care than anything a health professional does. When asked, staff nurses agreed that diabetes education should be provided to patients at each visit to facilitate learning through repetition. Even with the results of the PIN questionnaire, detailed prospective research is required to

determine if implementing education early in the patient's plan of care will improve the patient's health care status and thus decrease facility costs. The implementation of diabetes foot care education is a challenging task for healthcare providers. When providing diabetes education, it is important that nurses and other healthcare providers understand that knowledge acquisition does not ensure that the patient will change their behavior.

Limitations

This study was generalized to only one geographical area and targeted only type 2 diabetic patients. The length of the education sessions were 1.33 h (per participant). Administration of the post-questionnaire after only 2 weeks of education was adequate to measure an increase in knowledge but not adequate to obtain positive improvements in self-management of foot care. Another limitation was the small population sample size. The clinic lacked funding for education material. The educational material used was purchased by the facilitator and left in the clinic for future use. This intervention should be implemented on a larger sample and over a longer period for generalization and significance of effective foot health education in all clinic settings. The Centers for Medicare and Medicaid Services (CMS) limited reimbursement for follow-up DSMES training placed limitations on time and funding for the intervention.

Conclusions

The main goal of evaluation is to ascertain that the product meets the needs or help to obtain desired outcomes. The results of the evaluation should be used to correct deficiencies continuously and with uniformity [6]. Basic foot care education should be provided to a larger cohort in different clinic settings over a longer period. Since this is the first studies of its kind in this rural area, further research is needed to determine at which time during care basic foot care should be implemented and re-enforced. There should be a long-term follow-up to evaluate the results of the intervention (6–12 months) and remediation if warranted. If the follow-up education is provided during routine clinic visits the constraints on DSMES training would not affect the effectiveness or outcome of this education module. Increasing the number of face-to-face contacts with patients has implications for the development of future diabetes education program guidelines, and clinical and reimbursement policies regarding individual education. Such policies set the foundation for racially-, ethnically-, and socioeconomically, diverse education programs that will improve the patients' overall health care status and decrease facility costs.

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Compliance with ethical standards

Conflict of interest The author declare that she has no conflict of interest.

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