J Wound Ostomy Continence Nurs. 2022;49(6):559-563.
Published by Lippincott Williams & Wilkins

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Preventive Nail Care Among Diabetic Patients

A Quality Improvement Initiative

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VIDEO ABSTRACT

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PURPOSE: The purpose of this quality improvement initiative was to increase adherence to follow-up appointments in patients with diabetes mellitus for prevention of diabetic foot ulcers.

PARTICIPANTS AND SETTING: The sample comprised 33 adults with diabetes mellitus being cared for at an outpatient wound care clinic affiliated with a large metropolitan hospital in the state of Mississippi, located in the Southern United States.

APPROACH: This quality improvement approach used the Plan-Do-Study-Act method. Educational flyers and verbal instruction were provided to enhance adherence to preventive nail care and follow-up appointments. The goal for this quality improvement initiative was to increase adherence with preventive nail care and follow-up care.

OUTCOMES: Participants were provided with educational flyers and verbal instruction that emphasized the importance of follow-up clinic appointments, which promoted increased attendance at follow-up appointments. The proportion of patients who did not attend follow-up appointments fell from 9.2% prior to the intervention to 5.8% after its introduction.

IMPLICATIONS FOR PRACTICE: This quality improvement initiative positively impacted practice at a local wound care clinic in Mississippi resulting in a clinically relevant reduction in no-show follow-up visits when compared to the previous year.

KEY WORDS: Adherence, Foot and nail care, Nails, Patient compliance, Prevention patient education, Toenail care.

INTRODUCTION

Approximately 26.1 million individuals living in the United States will develop a new diabetic foot ulcer (DFU) annually.[1] A DFU is an open wound, commonly located on the bottom of the foot, in persons with diabetes mellitus.[2] In 2016, Mississippi ranked first in the United States for the prevalence of diabetes mellitus.[3] Prevention of DFUs is based on regular engagement in preventive foot care. Adherence to preventive diabetic foot care includes proper nail care, skin care, and appropriate daily footwear.[4] Poor nail care management, improperly cutting toenails, and toenail abnormalities are strong predictors of diabetic foot ulceration; thus, the presence of these conditions requires immediate attention.[5]

The American Diabetic Association (ADA) encourages daily foot hygiene and nail care for all persons with diabetes mellitus.[6] However, there is an identified gap in current and preferred practices regarding preventive education. In one study, correct toenail cutting was the most identified educational need among patients with diabetes.[7] Another study found that the most prevalent conditions among hospitalized patients with foot problems were thickened and damaged toenails.[8] Educating diabetic patients to take an active part in their own self-care is the cornerstone of establishing effective diabetes self-management, which will ultimately decrease the incidence of DFUs.[7] Branch and Lindholm[9] stressed that patient and family education should emphasize the importance and instruction to perform a daily foot examination, nail care, skin care, proper footwear, and foot deformities. In their guidelines for diabetic foot care, Schaper and colleagues[10] state that clinicians must demonstrate how to properly cut toenails.

Takehara and colleagues[11] reviewed the medical records of 126 patients with diabetes who received care from an outpatient diabetic foot clinic; 47.8% (n = 60) suffered from pincer nails, and 19.4% (n = 24) had toe nail abnormalities. These findings suggest that patients with diabetes mellitus have an increased risk for developing DFUs. Toenails are easy to observe; yet, a discrepancy between patient-recognized abnormalities and signs of ulceration was identified.

Another gap between current and preferred practices suggests that a stronger focus is needed on development, evaluation, and implementation of methods to improve adherence to preventive diabetic foot treatment, including proper toenail care.[5] Integrating foot care, managing self-care, wearing therapeutic footwear, and foot surgery, such as vascular surgery, amputation, and debridement, are key strategies to prevent DFUs.[12] Patient education regarding foot hygiene, toenail care, and proper footwear is fundamental and crucial to preventing DFUs.[13] Patient-friendly educational intervention coupled with regular provider reinforcement is also essential because it reduces the gap in the knowledge and is anticipated to increase adherence to foot care.[13]

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No declared conflicts of interests.

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DOI: 10.1097/WON.0000000000000915

Background and Rationale

A focused educational intervention can improve understanding and adherence related to DFUs.[13] The theory of self-efficacy may be applied in developing educational interventions to help patients better understand the significance of proper toenail care and decrease the incidence of DFUs. Ahmad Sharoni and colleagues[14] evaluated the efficacy of health education programs based on the self-efficacy theory of foot self-care behavior for diabetic patients. They found that self-care behavior, foot care self-efficacy, foot care outcome expectations, and knowledge of foot care improved after implementation of a self-efficacy enhancing program. Scheduled foot examinations by the patient and the provider are considered essential in all patients with diabetes.[13] A quality improvement (QI) approach through verbal education and reminder flyers could positively impact self-efficacy behaviors and follow-up care among patients with diabetes mellitus.

Our wound care clinic identified an issue related to poor adherence to preventive toenail care. The wound care clinic team provides care to diabetic patients with wounds, including DFUs. Often, patients seek treatment once they have developed a wound due to lack of preventive care. In many cases, the toenails are long and curve towards the plantar aspect of the patients' feet, resulting in a wound. Preventive guidelines are not consistently implemented.

Aim

This QI initiative aimed to improve education in patients living with diabetes mellitus related to preventive toenail care and subsequent follow-up appointments. The following clinical question guided the project: "In adult diabetic patients, what is the effect of educational flyers and verbal instruction on adherence with follow-up appointments, when compared to standard practice?" Adherence to preventive toenail care is relevant beyond this local clinic due to increased DFU-related complications, decreased health-related quality of life, and increased mortality rates among patients with diabetes.[15]

APPROACH

The SMART (Specific, Measurable, Achievable, Relevant, and Time-bound) framework guided this QI project.[16] The project leader (Z.O.B.) provided individual education on set days during May 2021 to August 2021 to participants at each visit, along with an educational flyer (Figure 1) designed to improve self-efficacy behaviors. The educational flyer was presented prior to checkout. The project leader (Z.O.B.) used an enriched structured approach to provide education and collect data. Recorded data included date of service, participants' sex, age, and race; documentation also included distribution of the educational flyer, verbal education, and a scheduled follow-up appointment for each participant. The patient record was later reviewed to assess for adherence to follow-up appointments. Patients who returned for visits on subsequent educational days received repeat education. The goals of the QI project were to increase the number of patients educated on preventive nail care and reduce "no-shows" (failure to attend or reschedule an established clinic visit). Project participants were adult patients with diabetes mellitus receiving services from a wound care clinic affiliated with a large metropolitan hospital located in Jackson, Mississippi. The wound care clinic provides wound care and hyperbaric treatments to adult patients.

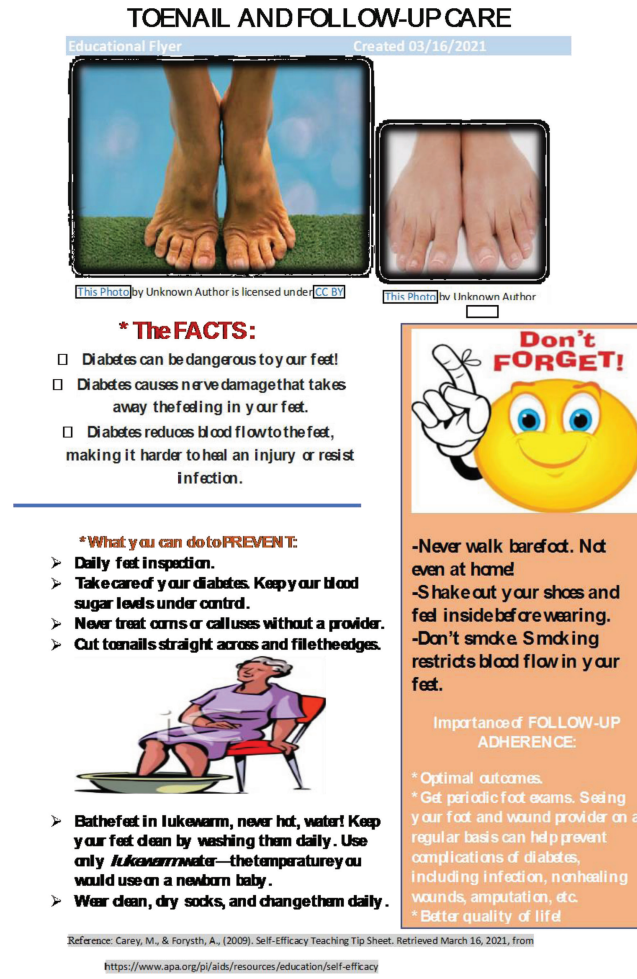


Figure 1. Educational flyer, "Toenail and Follow-up Care."

Quality improvement project procedures were reviewed and approved by the Baptist Institutional Review Board (Approval #21-20E).

Quality Improvement Model

The Plan-Do-Study-Act (PDSA) QI framework was used to test the effectiveness of verbal instruction and the educational flyers through comparison of the expected outcomes, actual outcomes, and continuous evaluation of rapid cycle change.[17] Weekly educational sessions began in May 2021, along with concurrent data collection. The office receptionist generated and provided to the team leader a list of all appointments for the scheduled dates of educational intervention. Each session lasted approximately 5 minutes; the brochure and education were delivered just before completion of an encounter in the wound care clinic.

The PDSA cycle allows for improvements, reevaluations, and recommendations; in the case of this project, the educational flyer was revised, adjusting the time it took to complete the education, and specifying a date to only collect data.[17] For example, several issues were identified that led to revisions of the initial flyer. The initial flyer was printed on thicker paper that was not easily folded in a manner allowing rapid visualization of follow-up appointment details. In addition, we observed that educational flyers were often left behind and multiple patients stated that they were not aware that the

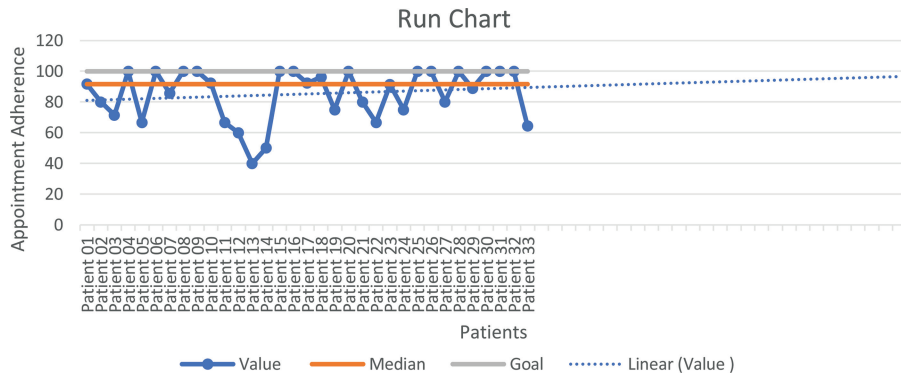


Figure 2. Run chart displaying 100% of participants were educated and a median total of 58% of patients adhered to follow-up appointments. Nineteen patients fell below the expected goal of 100%.

educational flyer was theirs to keep. As part of one PDSA cycle change, the flyers were reprinted on flexible paper that were easily folded so that follow-up appointment details were visible. This change made the brochure more effective as an educational tool and appointment reminder. As a second recommendation, tailoring time allotted for education was critical to ensure a patient-centered approach was implemented. The project leader adjusted education time according to patients' schedules. For example, education was provided before or after wound care treatment to ensure that wound care services were not interrupted. Also, patients who returned for visits on subsequent educational days received repeat education.

Outcome Measures

The outcome goal for this initiative was to improve adherence with preventive nail care including adherence to scheduled follow-up clinic visits. Demographic data including age, race, sex, history of diabetes mellitus, wound type, and adherence to scheduled follow-up appointments were gathered from review of electronic medical records. We also collected data regarding the number of patients who received preventive nail care education.

Outcomes Analysis

The proportion of patients who received educational intervention and brochures and the proportion of patients who adhered to scheduled follow-up clinic visits were calculated. A report comparing adherence with preventive nail care through adherence was generated. The Donabedian[18] model was used to evaluate the effect of our intervention. Trends for return visits to the clinic were captured on a run chart (Figure 2) to identify trends and variability in outcomes. Variability such as shifts in data, trends in data, low/high number of runs, or astronomical data were used to influence initiation of a PDSA cycle change.[17] The following run chart rules were applied: (*a*) shifts (6 or more data points either all above or below the center line), (*b*) trends (5 data points consistently trending up or down), (*c*) runs (identified as too few or too many runs, or crossing of the median line), and (*d*) astronomical points (data points that are visually different from others). Moreover, the Standard for Quality Improvement Reporting Excellence (SQUIRE) 2.0 guidelines were used to establish if observed outcomes were due to the implementation of the educational flyer.[19] Run charts and bar graphs were created to assess the impact of improvement efforts after the intervention was implemented.

A run chart was created for each participant who completed the educational intervention and brochure that calculated their adherence to follow-up appointments. Run chart data revealed no shifts or trends in data and no astronomical data points. Finally, to determine if the observed outcomes were due to the intervention, the total number of appointment no-shows and appointment reschedules from May to August 2020 was compared to the same time frame in 2021. We also identified attended and no-show appointment for 2020 and compared these data to the comparable time frame in 2021.

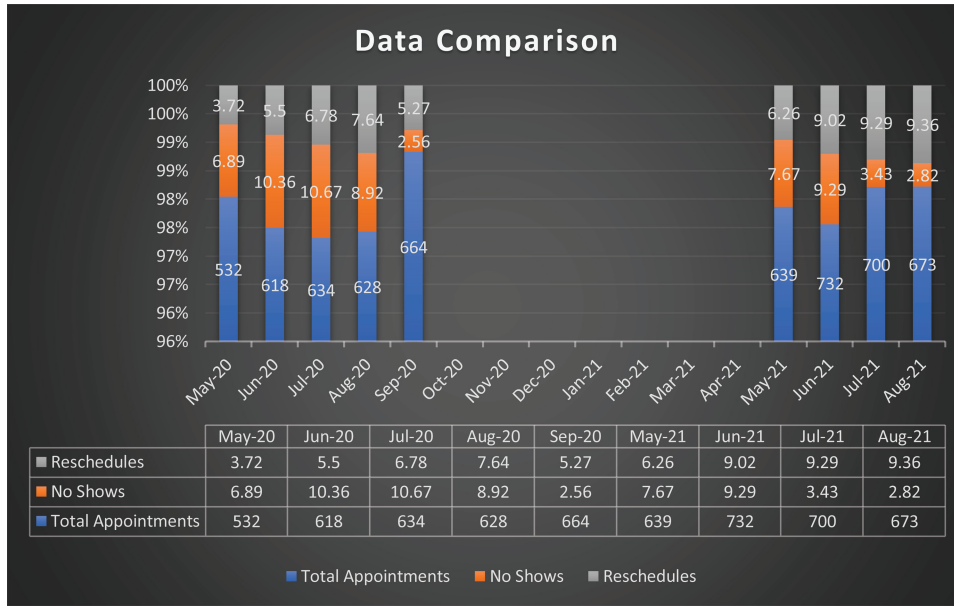
OUTCOMES

Thirty-three participants received verbal instruction and educational flyers. More than half (n = 19; 58%) adhered to follow-up appointments and 14 (42%) did not. Figure 3 provides a 100% stacked bar graph illustrating the total number of appointments, the number of no-show appointments, and the number of rescheduled visits from May-August 2020 to May-August 2021. The greatest difference was an 8.92% no-show appointment rate in August 2020 as compared to a 2.82% no-show rate in August 2021. In addition, 7.64% of appointments in August 2020 were rescheduled compared to 9.36% in August 2021. Figure 4 illustrates the number of missed follow-up appointments (expressed as a percentages) comparing May-August 2020 to May-August 2021. This rate improved from 9.21% in May-August 2020 to 5.8% in May-August 2021 (Figure 5). Considered collectively, outcome data support the aim of this QI initiative of improved adherence to follow-up appointments as an important aspect of diabetic foot care and prevention of diabetic foot ulcers.

DISCUSSION

We completed a QI project that evaluated the effects of an educational intervention and flyer for persons with diabetes mellitus and at risk for DFUs. The main outcome measure was adherence with follow-up appointments at a wound care clinic. Regular foot examinations by the patient and the provider are strongly recommended in all patients with diabetes.[13,20] After implementing the intervention, an overall decline in appointment no-shows from 9.2% to 5.8% resulted. Moreover, research suggests that self-efficacy can be increased by supplying clear instructions, skills, and demonstrating the desired behaviors.[14] We assert that providing patients with educational flyers and stressing the importance of follow-up care promoted desired outcomes among this vulnerable population.

It is imperative that educational interventions are implemented consistently to promote long-term effectiveness of this QI initiative. Research suggests that a patient-friendly educational intervention coupled with regular provider reinforcement is



	May-20	Jun-20	Jul-20	Aug-20	Sep-20	May-21	Jun-21	Jul-21	Aug-21
Reschedules	3.72	5.5	6.78	7.64	5.27	6.26	9.02	9.29	9.36
No Shows	6.89	10.36	10.67	8.92	2.56	7.67	9.29	3.43	2.82
Total Appointments	532	618	634	628	664	639	732	700	673

Figure 3. Data comparison. This 100% stacked bar graph compares the percentages that each value contributes to a total across all categories, including total appointments, total no-shows, and total reschedules.

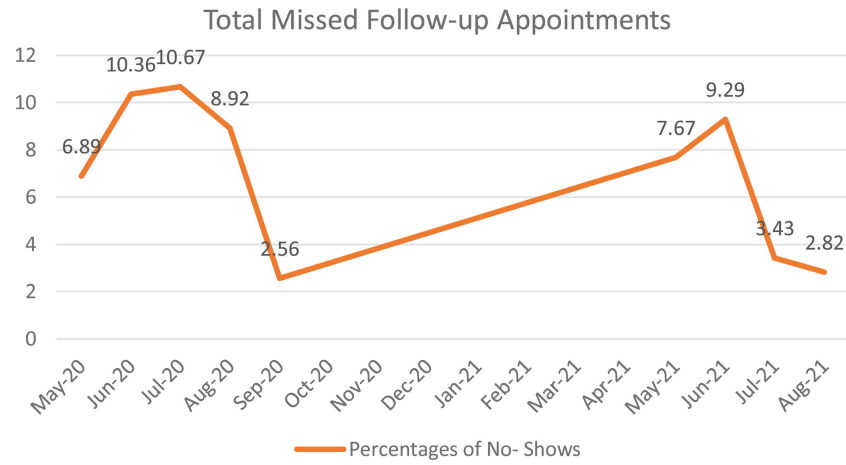


Figure 4. Total number of missed follow-up appointments (expressed as a percentages) comparing May-August 2020 (average of 9.21%) to May-August 2021 (average of 5.80%).

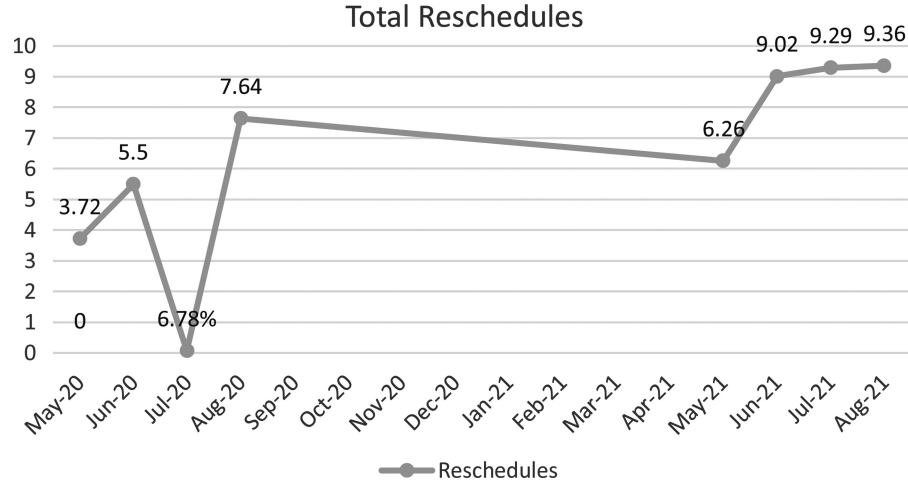


Figure 5. Total number of reschedules, as a percentage, from May-August 2020 (average of 5.91%) to May-August 2021 (average of 8.48%).

needed to reduce the gap in knowledge and adherence to foot care, which will ultimately reduce DFUs.[13] This project measured observed patient behaviors through return follow-up appointments. However, data collection and project implementation time were limited to 4 months. Additionally, education and verbal instruction were completed in approximately 5 minutes per encounter. Overall, a reduction in appointment no-shows decreased and rescheduled appointments increased.

CONCLUSION

We sought to improve the effectiveness of patient education regarding diabetic foot care and prevention of DFUs. This QI project demonstrated that a brief educational intervention and a brochure improved patient adherence with follow-up appointments among patients with diabetes mellitus. We recommend that project leaders remain flexible with time management, present education according to participants' learning preferences, and incorporate adjustments related to PDSA cycles when planning to undertake similar QI projects.

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DOI: 10.1097/WON.0000000000000930