



Increasing Diabetic Foot Exam Rates in Primary Care Via a Toolkit for Registered Nurses

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Quality Improvement Success Stories are published by the American Diabetes Association in collaboration with the American College of Physicians and the National Diabetes Education Program. This series is intended to highlight best practices and strategies from programs and clinics that have successfully improved the quality of care for people with diabetes or related conditions. Each article in the series is reviewed and follows a standard format developed by the editors of *Clinical Diabetes*. The following article describes an effort to increase diabetic foot screenings in a rural primary care clinic in Alabama.

Describe your practice setting and location.

The practice setting for this quality improvement (QI) initiative is a nurse practitioner-owned primary care rural health clinic located in northeastern Alabama. The clinic follows the Chronic Care Model to provide a comprehensive plan of care for more effective management of chronic diseases, improved communication, and continuity of care among collaborating clinicians. As a primary care setting, this clinic treats pediatric through geriatric patients for acute illnesses and numerous chronic conditions, including diabetes, hypertension, hyperlipidemia, chronic heart failure, and chronic obstructive pulmonary disease.

One full-time family nurse practitioner and one part-time family nurse practitioner provide patient care services to 400–500 patients per month, of whom 146 have

been diagnosed with diabetes. Diabetes is predominant in the rural community where the clinic is located, with 29.8% of the population having a diagnosis of diabetes in 2019 (1).

A local family practice physician serves as the clinic's off-site collaborator. The clinic also refers patients as needed to numerous ancillary facilities, per patient preference, for diagnostic and specialty services.

Describe the specific quality gap addressed through the initiative.

Diabetes is the seventh leading cause of death and the number one cause of lower-limb amputations in the United States (2,3). Throughout the world, a lower limb is amputated every 20–30 s as a result of diabetes-associated complications (4–6). People with diabetes have a 25% lifetime risk of developing a foot ulcer, and evidence shows an astounding 85% of lower-limb amputations are preceded by a diabetic foot ulcer (7). Of the patients who require lower limb amputations secondary to diabetes complications, more than half will die within 5 years (4). Current literature estimates that up to 75% of foot ulcers in people with diabetes are preventable with proper diabetic foot examinations and the implementation of evidence-based care guidelines (4).

Comprehensive diabetic foot screening is recommended, including a pinprick to assess small-fiber function, 10-g monofilament testing to assess large-fiber function and protective sensation, and palpation of foot pulses to screen for peripheral arterial disease (4,8). These exams not only help to identify neurological or circulatory dysfunction, but also stratify patients' risk for future complications (4,8). Both the American Diabetes Association (ADA) and the International Working Group on the Diabetic Foot emphasize the importance of early identification of people at risk for foot ulcerations through comprehensive diabetic foot screening at least annually or more frequently for those whose Wagner Scale ulcer risk classification level warrants it (4,8).

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The clinic's organizational needs assessment identified a practice gap of poor adherence to the ADA's recommendations for diabetic foot screening. This practice gap was placing adults with diabetes at increased risk of diabetic foot ulcers and potentially devastating health care outcomes, including limb loss.

How did you identify this quality gap? In other words, where did you get your baseline data?

QI and pay-for-performance reports generated from the organization's electronic health record (EHR) system revealed that only ~43% of adult patients with diabetes who should have received a comprehensive diabetes foot exam actually received one. This percentage fell alarmingly short of the 84% benchmark set by the Agency for Healthcare Research and Quality (9). Further conversation with the practice owner and employed advanced practice providers confirmed a gap in evidence-supported comprehensive diabetic foot exam screenings, citing short appointment times, lack of available testing equipment, and documentation requirements as barriers.

Summarize the initial data for your practice (before the improvement initiative).

Pre-intervention data were obtained through EHR reports specific to patients who were evaluated in the clinic within the previous 8 weeks (9 July to 2 September 2023) who had a documented *International Classification of Diseases*, 10th revision (ICD-10) diagnosis code of E10.0–E14.9. Each of the 42 qualifying patient visit records was audited to determine whether the patient had a documented comprehensive diabetic foot exam within the previous 12 months. Only 43% (18 of 42) of these patients had received a comprehensive diabetic foot exam at guideline-based intervals as determined by their risk category using the Wagner Scale. Additionally, of the 42 patients who should have been prescribed an appropriate diabetic foot exam follow-up interval or specialty referral if warranted, only 38% had a diabetic foot exam follow-up (16 of 42) or referral (0 of 42) prescribed.

What was the time frame from initiation of your QI initiative to its completion?

This was a 13-week improvement project beginning on 5 September 2023 and ending on 31 October 2023.

Describe your core QI team. Who served as project leader, and why was this person selected? Who else served on the team?

The project leader was a nurse practitioner implementing an evidenced-based intervention as part of a doctoral program to show mastery of leadership, collaboration, and advocacy to improve patient outcomes and close health care gaps. The project champion was the clinic owner and lead nurse practitioner, whose engagement and leadership were instrumental in securing additional stakeholder buy-in and overall project success. Additional team members included two registered nurses (RNs), one medical assistant, and the office manager.

Describe the structural changes you made to your practice through this initiative.

There were four initiatives associated with the interventions implemented in this project: training sessions, introduction of single-use foot screening toolkits in each exam room, a customized EHR template, and the use of the RNs' full scope of practice to complete the diabetic foot exam.

As an integral part of the health care team, RNs play a pivotal role in preventing and managing diabetic foot complications and are essential providers of care and education to at-risk patients. In true collaborative form, RNs perform regular foot assessments and examine patients for signs of neuropathy, poor circulation, foot ulcers, or other abnormalities, which allows for early identification, prompt intervention, and prevention of worsening conditions.

To use the RNs' full scope of practice, a Standardized Procedure Application to perform the monofilament component of the diabetic foot exam was submitted to the Alabama Board of Nursing (ABN). The Standardized Procedure Application required approval from the clinic, as evidenced by the signatures of the Alabama-licensed RN who has oversight responsibility for the monofilament exam, an Alabama-licensed physician, and the clinic's chief executive officer. The Standardized Procedure Application also required a policy and procedure, an organized program of study by a qualified instructor, a plan for supervised clinical practice, and a plan for demonstration of competence, both initially and at periodic intervals thereafter. ABN approval was obtained prior to the implementation of the intervention.

A PowerPoint presentation was provided to educate the nurse practitioners, RNs, medical assistant, and office manager on the statistical importance of timely diabetic

foot exams, the required screening components, and the appropriate technique for performing these exams. The education also included how to identify a previous foot exam in the EHR and the proper EHR template to document the completed diabetic foot exam. This educational session was a working staff meeting with lunch provided. Each RN and nurse practitioner was required to return-demonstrate proper foot exam technique before the project was implemented.

Each exam room was stocked with single-use foot screening toolkits. Each toolkit consisted of a #10 4- by 9-inch envelope containing one Baseline disposable 10-g monofilament with an ADA test site chart, one Medipin single-use neurological pin, one Cornerstones4Care 2021 *Foot Care for People With Diabetes* educational handout, and a blank piece of 8- by 11-inch paper to assist with the footwear assessment (i.e., on which to trace the foot and then compare the tracing outline to the shoe). Each exam room maintained a minimum daily supply of 10 toolkits. The cost for supplies of each toolkit was \$1.92.

Describe the most important changes you made to your *process* of care delivery.

As part of the rooming process for patients, RNs performed the initial screening to determine whether patients met the criteria to receive a foot exam. If the criteria were met, the RNs instructed patients to remove their socks and shoes in preparation for a foot exam, populated the foot exam template into the office visit encounter note, and performed the diabetic foot exam using the single-use toolkit. The comprehensive diabetic foot exam included visual inspection of skin integrity and foot deformities, assessment of posterior tibial and dorsalis pedis pulses, evaluation of footwear and socks, and neurological testing with a 10-g monofilament and neurological pin. The RNs also educated patients on proper foot care, provided them with written educational materials, and recorded their examination findings on the appropriate, pre-populated EHR template.

As the final component of the process, the nurse practitioners reviewed the documented findings to determine patients' ulcer risk using the Wagner Scale, placed a hard stop alert in the EHR of patients requiring a screening interval more frequent than annually based on their ulcer risk, and prescribed the appropriate follow-up assessment interval and/or any referral or treatment needs.

Chart audits using a checklist occurred weekly to ensure that interventions were being implemented correctly and consistently and to identify any barriers to implementation.

Each week, the project manager (i.e., the doctoral nursing student) populated a report from the clinic's EHR of all visits that were coded with any ICD-10 code of E10.0–E14.9 for the previous week. The doctoral student then reviewed each chart to identify whether the comprehensive foot exam was performed by an RN, the risk assessment was documented by the nurse practitioner, the follow-up diabetic foot exam interval and/or referral was ordered by the nurse practitioner, and the proper EHR template was used for documentation. During weeks 4 and 6, the project manager directly observed the RNs performing the comprehensive foot exams using a competency checklist to ensure proper adherence to foot screening guidelines.

Capitalizing on the RNs' full scope of practice in a collaborative comprehensive diabetes management role resulted in increased implementation of ADA-recommended foot exam guidelines. Additionally, this collaboration fostered thorough, patient-centered care addressing multifaceted aspects of health, which, in turn, will lead to improved patient outcomes, increased patient satisfaction, and more efficient health care delivery.

Summarize your final outcome data (at the end of the improvement initiative) and how they compared with your baseline data.

Over the 8-week intervention period, 58 patients met the inclusion criteria of having a diabetes diagnosis (ICD-10 code E10.0–E14.9) and no documented foot exam within the past 12 months. Of the 58 qualifying patient visits, 43 patients (74.1%) received a comprehensive diabetic foot exam by an RN using a single-use toolkit. This was a statistically significant increase of 31% in the rate of completed foot exams from the pre-intervention baseline period. The odds of a foot exam being administered increased from pre- to post-intervention (odds ratio [OR] 3.82, 95% CI 1.64–8.92).

There was also a statistically significant increase of 32% in the proportion of prescribed foot exam follow-ups at appropriate screening intervals (40 of 43) or referral to podiatry or wound care if warranted (1 of 43) from pre-intervention (38.1%) to post-intervention (70.7%). The odds of a prescribed diabetic foot exam follow-up interval or a referral increased from pre- to post-intervention (OR 3.92, 95% CI 1.69–9.09). Table 1 shows the cross-tabulation associated with the χ^2 analyses.

What are your next steps?

We have adopted focused patient education and interdisciplinary teamwork as core strategies that are easily

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TABLE 1 Cross-Tabulation of the χ^2 Analyses

Outcome	Yes, n (%)	No, n (%)	OR (95% CI)	P
Foot exam			3.82 (1.64–8.92)	0.002
Pre-intervention	18 (42.9)	25 (57.1)		
Post-intervention	43 (74.1)	15 (25.9)		
Referral			3.92 (1.69–9.09)	0.001
Pre-intervention	16 (38.1)	26 (61.9)		
Post-intervention	41 (70.7)	17 (29.3)		

adaptable in diverse health care landscapes. The design of this QI project incorporates all of the ADA-recommended foot exam components—assessment of skin, foot deformities, and neurological and vascular function, as well as provision of patient education on preventive foot self-care and appropriate footwear selection—in an efficient, collaborative process. Additionally, the toolkit and EHR template created for this QI project capture the requirements for Merit-Based Incentive Payment System measures 126 and 127 and Centers for Medicare & Medicaid Services eMeasure 123 for diabetic foot exam.

To ensure that the practice change achieved will be sustained, the office manager added diabetic foot exams to the clinic's quarterly performance reports to audit compliance. If a downward trend in completed foot exams (or a completion rate of <85%) is detected on the quarterly performance reports, chart audits will be performed on 25% of visits for patients with diabetes during the respective quarter using the formative evaluation checklist provided during the project's implementation to identify opportunities for improvement. Newly hired medical assistants or RNs will be required to complete the same foot exam training and competency mastery used for this project to ensure the continuity and accuracy of the implemented practice change.

What lessons did you learn through your QI process that you would like to share with others?

Support and active engagement from leadership and stakeholders foster a culture that values the QI mission and is crucial to the success of practice change efforts. Allowing the RNs to use their full scope of practice created a sense of empowerment, ownership, and commitment to improving patient outcomes. Developing a QI team that is diverse in experience and licensure encourages broad perspectives and creative solutions.

Combining the required evidence-based tools to perform a comprehensive diabetic foot exam into a single-use toolkit

and using RNs' full scope of practice to perform comprehensive diabetic foot exams was an effective combination to improve guideline compliance and increase the rates of completed diabetic foot exams for patients in a rural primary care clinic.

As the worldwide prevalence of diabetes continues to rise, emphasizing the need for and improving the rate of diabetic foot exams becomes imperative to reduce the overall health care burden, improve patient outcomes, and enhance the quality of life for individuals living with diabetes.

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DUALITY OF INTEREST

No potential conflicts of interest relevant to this article were reported.

GUARANTOR AUTHOR

As the sole author, V.S.L. is the guarantor of this work and, as such, had full access to all data reported and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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