The Process of Implementing a Rural VA Wound Care Program for Diabetic Foot Ulcer Patients

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Delivering and documenting evidence-based treatment to all Department of Veterans Affairs (VA) foot ulcer patients has wide appeal. However, primary and secondary care medical centers where 52% of these patients receive care are at a disadvantage given the frequent absence of trained specialists to manage diabetic foot ulcers. A retrospective review of diabetic foot ulcer patient records and a provider survey were conducted to document the foot ulcer problem and to assess practitioner needs. Results showed of the 125 persons with foot ulcers identified through administrative data, only 21% of diabetic foot patients were correctly coded. Chronic Care and Microsystem models were used to prepare a tailored intervention in a VA primary care medical center. The site Principal Investigators, a multidisciplinary site wound care team, and study investigators jointly implemented a diabetic foot ulcer program. Intervention components include wound care team education and training, standardized good wound care practices based on strong scientific evidence, and a wound care template embedded in the electronic medical record to facilitate data collection, clinical decision making, patient ordering, and coding. A strategy for delivering offloading pressure devices, regular case management support, and 24/7 emergency assistance also was developed. It took 9 months to implement the model. Patients were enrolled and followed for 1 year. Process and outcome evaluations are ongoing.

KEYWORDS: diabetes, foot ulcer, systems of care, electronic medical records, wound care

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Diabetic foot ulcers occur annually in 3% of the US population with diabetes. Among veterans under the care of the Department of Veterans Affairs (VA), 20% have diabetes and approximately 26,000 of these veterans develop foot ulcers each year, increasing their risk for amputation. Approximately two-thirds of VA amputations occur in persons with diabetes.

Effective treatment of foot ulcers in people with diabetes is based on strong scientific evidence and is termed good wound care. Evidence is strong for improved foot ulcer healing with repetitive sharp debridement, effective antimicrobial treatment of invasive bacterial infection, consistent offloading of pressure, dressings that promote a moist wound healing environment, and continuity of care. These fundamental elements of care for patients with diabetic foot ulcers, taken with a directed initial assessment of the patient’s condition (including sensation, circulation, anatomic and functional abnormalities, diabetes control, and comorbid conditions), are not complicated to perform. Yet their consistent, coordinated implementation in healthcare systems has proven difficult.

As a consequence, amputations and other complications from diabetic foot ulcers remain a serious problem for the largest US healthcare organization, the VA, as well as other healthcare organizations.

Providers from the VA represent multiple professional disciplines with highly variable education and training in wound care. In primary and secondary care centers, the provider mix for foot ulcer care often is determined by who is available and disposed to offer care. It is difficult for many willing professionals to balance the repetitive and painstaking demands for good wound care in medically and socially complex, time-consuming, foot ulcer patients with the competing demands of their acutely ill patients.

Evidence to document that a combination of good wound care strategies will decrease time to ulcer healing, increase ulcer-free survival, and improve patient, provider and institutional acceptance of organized foot ulcer care is limited. This article documents the foot ulcer problem and discusses preparation for and implementation of a foot ulcer intervention program for a rural VA primary care medical center.

**Methods**

**Study setting.** The Jonathan M. Wainwright Memorial Walla Walla VA Medical Center (VAMC) is a primary care center serving 14,000 veterans who reside in a catchment area of 42,000 square miles. Three community-based outpatient clinics, located 54, 100, and 120 miles away in Richland, Wash, Yakima, Wash, and Lewiston, Idaho, respectively, areadministratively and clinically linked to the medical center. Medical care at the Walla Walla VAMC is provided by 8.5 primary care providers. Two community podiatrists began working two afternoons each month at the VA in 2005. A 26-bed skilled nursing facility is available for non-critical patients requiring ongoing observation and care, including wound care, rehabilitation, and hospice. Human Subjects approval to conduct this study was secured from the University of Washington and the VA Multi-Site Human Subjects Committees.

**Problem assessment.** The authors interviewed 19 key Walla Walla VA and community providers to ascertain their level of interest in the study and to discuss study strategies. Each Walla Walla VA physician, nurse practitioner, and physician assistant (PA) received a mailed survey adapted from the “Foot Care Systems Assessment Tool” developed by the VA study, “Impact of a Quality Management Intervention Upon Foot Care Outcomes.” The survey requested information and opinions regarding care coordination.

**KEY POINTS**

- Many studies have identified and documented barriers to implementing evidence-based wound care.
- To assess and address these barriers for patients with diabetic foot ulcers in the Veterans Administration healthcare system, the authors conducted a chart review and needs assessment to help develop a foot ulcer program for a rural VA primary care medical center.
- The methods used can be readily adopted by clinicians in other VA or non-VA healthcare settings.
strategies, the quality of the communication network, available resources, and information support.

A retrospective record review was conducted of diabetic foot ulcer care at the study site between 2003 and 2004. Foot ulcers, infection, arthropathy with infection, and osteomyelitis were searched using ICD codes to encompass the spectrum of diabetic foot ulcer care (707.1, 681.1, 681.9, 682.6, 682.7, 711.07, 730.07, 730.17, 730.27). Expectation was that the sensitivity of the diagnostic codes for retrieving patients with diabetic foot ulcers would be high and their diagnostic specificity low. Criteria for the diagnosis of diabetic foot ulcer were: 1) the patient had a diagnosis of diabetes; 2) the patient had at least one foot; 3) the patient had at least one ulcer below the malleoli; and 4) the ulcer was not primarily attributable to other causes of skin ulceration on the foot including those related to chronic pressure, vasculitis, toxic envenomation, pyoderma gangrenosum, gout, and arterial insufficiency. Records meeting criteria for diabetic foot ulcer diagnosis were uniformly abstracted by a physician and a wound specialist/dermatologist to document the care processes and the delivery of elements of good wound care.

Conceptual models. The Chronic Care Model was used as a framework for this research (see Figure 1). The Chronic Care Model provides a roadmap to guide the solution to complex systemic problems and to address the mismatch between needs of patients with chronic illness and a care system designed for acute illness. The authors also developed a Microsystem model to identify the interrelationships between the investigators at VA Puget Sound Health Care System and the Chief of Staff and Wound Team at Walla Walla VAMC during and after the intervention period (see Figure 2). At the conclusion of the intervention period, all the enhancements to the computerized patient record system (CPRS), the delivery system, and changes in the healthcare organization will remain in place at Walla Walla VAMC; the Seattle-based Research and Clinical Experts withdraw.

Good wound care. Good wound care is defined as the set of principles to be applied to every patient at every foot ulcer encounter. Included are debriding callus and devitalized tissue, measuring the wound, treating invasive bacterial infection, offloading weight, providing a moist wound healing environment, providing a global assessment (is the wound better, the same or worse?), and scheduling regular follow-up care to insure continuity of care.

Study design, cooperative agreement, and roles of site Principle Investigators, wound care team, and study investigators. This study began in 2005 with onsite planning, education, and preparation for implementation. The roles of the Site Principle Investigator (PI), who was the Chief of Staff for Walla Walla VAMC, the site wound care team, and study
investigators were negotiated by the authors and formalized in a Cooperative Agreement before the onset of the study. The Site PI selected the members of the site wound care team, provided salary and travel for training the wound care team members when not supported by the research project, identified space for the study clinic, provided oversight on credentialing and privileging the study clinicians, provided leadership support to facilitate communication and cooperation for the wound care program throughout the medical center, and eliminated the co-pay for study participants. He agreed to maintain the wound care team for at least 1 year following the conclusion of the study.

The site wound care team was identified by the Chief of Staff and nursing supervisor. Included were a PA, a registered nurse (RN), an occupational therapist, a nursing assistant, and an administrative assistant to manage the clinic schedule. None of the identified clinical team had prior targeted education, training, or experience in wound care.

The study investigators were responsible for teaching, mentoring, and supervising the work of the ulcer care team, performing hands-on ulcer care, and providing telewound consultations using transmission of secure clinical and radiological images to enhance decision-making. One study investigator developed a system for collecting clinical and study data by developing and implementing a foot ulcer care template for the VA Computerized Patient Record System (CPRS) to simultaneously reinforce the clinicians' training and to record study patient data. The investigators provided computer hardware and software and were responsible for extracting study data from the CPRS, then analyzing the study data.

Preparing the intervention.

CPRS template. A focus group of expert clinicians was convened to design an algorithm for diabetic foot ulcer care and translate that algorithm into a clinical reminder template in the VA's CPRS that would 1) collect data, 2) guide clinical decision-making, 3) standardize ordering of laboratory and imaging studies, pharmaceuticals and supplies, and 4) improve coding and billing processes.14

To coordinate with primary care both at the medical center and at the outlying clinics, facilitated consultation mechanisms were embedded into the CPRS. One investigator was available 24/7 for oversight, consultations, and care coordination to ensure that optimum care was available for study patients.

Study logistics. Bringing together the clinical materials needed for good wound care proved to be time-consuming, requiring the full 9-month preparation time. Space and scheduling issues were addressed early. Standard scheduling formats were not suitable to ensure adequate clinic throughput and were met with initial staff resistance. Clinic equipment was procured by the VA Puget Sound and Walla Walla VAMC. Pharmacy and Supply Services worked with the authors to acquire basic wound care pharmaceuticals and supplies, purchase surgical
instruments, and facilitate their processing and distribution. The most commonly used devices and footwear to offload weight were recommended by colleagues at VA Puget Sound. Space was allocated in the clinic area for storage of offloading footwear, insoles, and devices. A mobile workstation was built for the Offloading Therapist’s equipment to allow the team to dispense same-day offloading pressure devices. Consultation and inventory control protocols for offloading pressure devices and therapeutic footwear were developed within the electronic medical record.

Team education, training, and mentoring began with a weekly wound care text review of wound care concepts for the PA and RN with one of the study authors. This text book review spanned a 4-month interval that also included formal education programs, tutorials, and onsite clinical training from the University of Washington, VA Puget Sound, and Harborview Medical Center. The PA and RN completed wound care certification examinations through accredited societies.

An evidence-based protocol was developed outlining the care of patients with ulcers. All members of the team received training on the study procedures in the 9-month preparation period before the onset of the study.

The need for coordinated teamwork in the management of each individual patient was emphasized to all wound care team members. All team members were expected to interact with the patient at each encounter. To this end, team members were cross-trained as much as possible and a “no work silos” expectation was set. All team members were trained in medical photography and in conducting the research aspects of the study. All team members were trained/exppected to remove and apply dressings and to perform basic callus and nail care and patient education. Although only the PA had prescriptive authority for pharmaceuticals, both the PA and RN were fully trained and capable of performing patient evaluation, wound assessment, and debridement. Although the Offloading Therapist was responsible for prescribing, dispensing, and fitting offloading devices for patients, all team members were expected to check the fit and appropriateness of shoes and inserts and consult with the therapist as needed.

Patients were asked to complete a baseline questionnaire on demographics and health history, education, and self-care practice. At the time of their ulcer outcome, patients reported current findings on education and foot self-management. At the conclusion of each study visit, patients completed a one-page patient satisfaction survey and returned it directly to the Seattle investigators in an addressed, postage-paid envelope.

Implementation period. The 1-year implementation period began in October 2006. Patients were usually seen the same day as presentation and scheduled into the diabetic foot ulcer clinic. Providers within the medical center recognized the value of this service and began more frequent consults with the wound care team and became more engaged in continuing education. As the choreography of the team approach to patient care matured, a new paradigm for clinic scheduling was implemented that permitted compression of appointment slots with resulting greater appointment supply and clinic capacity.

During the intervention, the investigators conducted a weekly V-tel (face-to-face video-conference) case-management conference where patient progress was reviewed, suggestions for improving treatment were discussed, and care was coordinated between the study site and the investigators’ tertiary care center. Complex patients requiring a detailed review of the medical history, physical findings, laboratory, and imaging studies were identified and after review, the consultant prepared a written note for the medical record. Elective transfers between medical centers for consultations, vascular surgical studies and interventions, and orthopaedic or podiatric reconstructive procedures were arranged during this weekly patient-care conference.

Study investigators visited the study site on a bi-monthly basis. Activities included a 3-hour dermatology/wound clinic, patient rounds, research team meetings, morbidity and mortality reviews, journal clubs providing continuing medical education on relevant topics, and open medical center meetings when the investigators were available to problem-solve or answer questions posed by Walla Walla providers.

The study analysis included a multidisciplinary expert panel to review and classify the diabetic foot
ulcers. During the analysis period, it will be determined whether the elements of good wound care were delivered and whether a pre-/post difference was found in time to healing, ulcer-free survival, iatrogenic events, ER visits, hospitalizations, amputations, and deaths. At the conclusion of the study, the analysis will include patient, provider, and system outcomes.

Results

The initial mail-out, mail-back Foot Care Systems Assessment Tool used to survey providers yielded a 77% response rate. Several themes emerged from the interviews and surveys: 1) the clinicians wanted ready access for their primary care patients to wound care specialists, 2) open access to the wound clinic was judged to be impractical because of the limited number of patients that could be accommodated, 3) great distances involved in travel to tertiary care facilities made a teleconsultation system imperative, and 4) recruitment of new personnel was difficult; ways to utilize existing personnel to meet the study needs were needed. Providers also identified a need for coordinating care strategies, improving the communication network, identifying resources, and developing information support.

The initial medical records review of diabetic foot ulcer patients in 2003/2004 identified 180 patients coded with “diabetic foot ulcer” from the administrative VA Austin data. When these records were reviewed, ulcers were found to have occurred in 125 unique individuals; however, only 26 (21%) met the criteria for a diabetic foot ulcer. Among the remaining 99 patients (79%), the accurate diagnoses were decubitus ulcers, acute trauma such as punctures or insect bites, arterial insufficiency, surgical wounds, or wounds resulting from vasculitis, pyoderma gangrenosum, or gout. Table 1 shows the frequency with which elements of good wound care were being delivered in 2003/2004. The element that was best recorded both at baseline and on the follow-up visits was presence or absence of infection (75% of visits). Peripheral circulation and sensory exams were documented 46% and 27% of the time, respectively. Wound measurements were documented 23% of the time and debridement was performed only 4% of the time on the initial visit and 16% of the time on subsequent visits. These findings identified areas for improvement.

Discussion

Care of patients with diabetic foot ulcers, while based on firm scientific evidence, has remained problematic. The incidence of lower extremity amputation in the US remains unacceptably high. In the authors’ opinion, no single intervention is sufficiently robust to improve the outcomes for patients with ulcers at risk for amputation. Accordingly, in this research, a new system for wound care based on the Chronic Care Model and the Microsystem Model was carefully crafted to fit the primary care VA medical center’s culture and needs. The goal was to ascertain whether care processes and outcomes could be improved. This is the first study of diabetic foot ulcer care to be designed using the roadmap of the Chronic Care Model. No “cookie-cutter” intervention would have gained the widespread support from medical center administration and staff and have led to the kinds of results observed.
Intervention strengths include 1) strong support from the medical center’s administration, 2) the site PI and team leader are highly respected by medical center professionals, 3) superbly trained, highly motivated, energetic, and passionate clinicians were involved; 4) an enthusiastic team spirit permeated all corners of the medical center to make care for veterans with chronic wounds part of the institutional culture, 5) the delivery system was designed to fit the needs and culture of the institution, 6) bi-directional communication between the primary and tertiary care facilities facilitated smooth patient hand-offs, 7) novel and creative uses of a sophisticated clinical information system provided data for clinical and research purposes, and 8) patients have been involved, informed, and motivated in a unique way.

This intervention was not easy to implement. The time and effort required to bring each piece of this complex intervention to life was grossly underestimated. A full 9 months was required to implement the study and 6 months was necessary for the team to completely “bond.” Good faith, mutual trust and respect, and a strong desire to make things better for veterans ultimately solved all the problems.

Conclusion
Excellent scientific evidence supports the efficacy of the elements of good wound care. Healthcare systems are not well designed to repetitively and consistently deliver a package of good wound care. The authors used the roadmap of the Chronic Care Model to design and implement a system to deliver good wound care, an intervention based on a comprehensive assessment of the needs, resources, and culture of a unique primary care VA medical center. Although data collection is nearly complete, the approach is promising and provides insight into effective system changes for wound care in primary and secondary medical centers.

References