Partnerships between podiatrists and vascular surgeons in building effective wound care centers

Venita Chandra, MD,[a,*] Natalia O. Glebova, MD, PhD,[b,*] Nichol L. Salvo, DPM,[c,†] *and* Timothy Wu, MD,[d,*]
Stanford, Calif; Aurora, Colo; Decatur, Ga; and Newark, NJ

ABSTRACT

This practice memo, a collaborative effort between the Young Physicians' Program of the American Podiatric Medical Association and the Young Surgeons Committee of the Society for Vascular Surgery, is intended to aid podiatrists and vascular surgeons in the early years of their respective careers, especially those involved in the care of patients with chronic wounds. During these formative years, learning how to successfully establish an interprofessional partnership is crucial to provide the best possible care to this important population of patients. (J Vasc Surg 2017;66:902-5.)

The majority of chronic wounds present on the lower extremity, with the prevalence in the adult population between 0.18% and 1.3%.[1] Chronic wounds represent a growing, worldwide, and silent epidemic that is resulting in a public health and economic threat in the United States.[2] With the physical and emotional burden on patients, the loss of productivity for afflicted individuals and their families, and the increasing amount of money spent on wound care, this condition is a major burden to our society. Approximately 12% of individuals with a foot ulcer will require some level of amputation, which further burdens the patient with additional loss of productivity and increased comorbidity.[2] Chronic wounds encompass a vast array of causes, including diabetes, trauma, venous disease, ischemia, pressure, infection, irradiation, vasculitis, and many more. Caring for each wound type can be complex and time-consuming, requiring multidisciplinary expertise with varying treatment requirements. By some estimates, the prevalence of nonhealing chronic wounds in the United States is around 2%, affecting >6 million individuals and growing.[2-4] Not surprisingly, the costs associated with treating chronic wounds also are growing rapidly. Although it is difficult to calculate the exact burden, it is thought that more than $25 billion is currently being spent in the United States to address chronic wounds.[1,2]

Before the establishment of dedicated wound care centers, patients would receive wound treatment from the specialists they visited, typically without careful monitoring and oftentimes with minimal facilities and resources available for débridement and other advanced treatments.[5] As both podiatrists and vascular surgeons are often at the frontline of wound care in the current health care environment, these specialists now have a unique opportunity to bring together a multidisciplinary team to advance the delivery of wound care and to become physician leaders in dedicated wound care centers.

CLINICAL EFFECTIVENESS OF WOUND CARE CENTERS

Whereas it is difficult to directly compare outcomes before and after the advent of wound care centers because of the varied and often poorly documented wound care before such organizations, examining surrogate markers of success, such as amputation and limb salvage rates, can help us understand the clinical effectiveness and impact of wound care centers. Some studies have demonstrated a reduction in major amputation rates from 36.4% to 6.7% among people with diabetes treated by a multidisciplinary team.[6] Protocol-based multidisciplinary wound care has also been shown to have significantly improved outcomes with other populations of patients and wound types, including pressure and venous stasis ulcers.[7-11]

There also is some suggestion that the streamlined approach provided by a modern wound care center may potentially play a role in decreasing length of stay (LOS) for patients undergoing lower extremity arterial bypass surgery. A recent study found that noninfectious wound complications (eg, wound dehiscence, lymph leak, nonhealing surgical wounds) were among the strongest factors associated with an increased LOS.[12] The authors suggested that patients remained in the hospital for treatment of these issues, and LOS could

From the Division of Vascular Surgery, Stanford University, Stanford[a]; the Division of Vascular Surgery & Endovascular Therapy, University of Colorado, Aurora[b]; the Podiatry Section, Atlanta VA Medical Center, Decatur[c]; and the Division of Vascular Surgery, Rutgers New Jersey Medical School, Newark.[d]

*Society for Vascular Surgery Young Surgeons Committee

†American Podiatric Medical Association Young Physicians' Leadership Panel

Author conflict of interest: none.

This article is being co-published in the *Journal of Vascular Surgery*® and the *Journal of the American Podiatric Medical Association*.

Correspondence: Timothy Wu, MD, Division of Vascular Surgery, Rutgers New Jersey Medical School, 150 Bergen St, Ste F102, Newark, NJ 07103 (e-mail: tw394@njms.rutgers.edu).

The editors and reviewers of this article have no relevant financial relationships to disclose per the JVS policy that requires reviewers to decline review of any manuscript for which they may have a conflict of interest.

0741-5214

http://dx.doi.org/10.1016/j.jvs.2017.06.071

potentially be decreased by streamlining postoperative care as well as by preventing complications.

In addition to benefiting patients, multidisciplinary wound care centers allow and encourage collaboration across health care disciplines and enhance educational opportunities. Thus, providers also benefit from multidisciplinary care by gaining increased clinical efficiency, more easily developing patient referrals, and realizing opportunities for clinical research.[13]

COST-EFFECTIVENESS OF WOUND CARE CENTERS

A comprehensive team approach to wound care has been demonstrated not only to improve outcomes but also to be cost-effective.[14-16] The care of chronic wounds, as previously discussed, is associated with significant direct and indirect costs. Direct costs include items such as supplies, caregiver time, consultations, and laboratory work. Indirect costs include days lost from work, treatment complications, costs of waste, and other opportunity costs.

Fife and Carter looked at wound care outcomes and associated costs among patients treated at U.S. outpatient wound care centers.[17] The average cost to heal a wound was $3927. The cost to heal increases as the number of comorbid conditions increases, however, with diabetic foot ulcers being the most expensive type of chronic ulcer, with an average cost per wound of $5391. Not surprisingly, for patients observed for long periods, the cost of care increased as treatment duration lengthened. Driver et al also demonstrated higher costs for diabetic patients, documenting the cost of managing a diabetic foot ulcer patient (including inpatient and outpatient treatment) to be $17,245.[18]

Whereas it is difficult to calculate the costs of all downstream complications from chronic wounds, one outcome that is often evaluated, particularly for diabetic foot ulcers, is amputation. Amputations have substantial direct and indirect costs, totaling more than $43,000 for minor amputations (below the ankle) and more than $63,000 for major amputations (above the ankle).[19] Several studies, however, have demonstrated that the establishment of multidisciplinary teams to manage diabetic foot ulcers is cost-effective, particularly in the long term.[20-23] For example, Ollendorf et al developed a model to specifically evaluate the effects of different types of interventions on diabetic patients. After applying the model to a hypothetical cohort of 10,000 individuals with diabetes, they demonstrated that a multidisciplinary clinic could avoid 47% of amputations, which translates into $740,677 in potential savings during 1 year. With the addition of other risk reduction strategies, such as patient and provider education and insurance coverage for therapeutic shoes, they demonstrated a 3-year potential savings of between $2900 and $4442 per person, corresponding to a total potential benefit range of $2 to $3 million during 3 years.[20]

PROVIDER STAFFING AND THE MULTIDISCIPLINARY AND INTERDISCIPLINARY WOUND TEAM

Multidisciplinary care for patients with ischemic wounds increases amputation-free survival compared with standard wound care,[24] and the multidisciplinary limb salvage team approach heals neuroischemic wounds and decreases readmissions that are frequent in this population of patients.[25] Thus, a successful wound care center is a truly multidisciplinary endeavor.

Several aspects of the patient's clinical condition need to be successfully managed and coordinated to promote efficient wound healing.[26] Many patients with problem wounds have diabetes mellitus and need optimum management of diabetes in addition to topical wound care and off-loading to expedite wound healing. Wound débridement and assessment of the need for revascularization are essential. Repeated débridement may be necessary, and consistent follow-up provided by a multidisciplinary team is instrumental in ensuring adherence of the patients. The inconvenience and logistical complexity of seeing multiple specialty providers and having several imaging or procedure appointments at different locations and times may result in poor follow-up, compliance, and outcomes. Thus, space and time for a coordinated clinic where multiple appointments can be arranged in a single time block further help remove these barriers and allow consistent follow-up.

Staffing of a multidisciplinary wound care center involves a group of dedicated providers from several disciplines. Podiatrists have an array of topical treatment options and an understanding of foot biomechanics that allow specific off-loading approaches to promote wound healing. Complex wounds may require rotational or free flaps for tissue coverage and thus participation by plastic surgeons. Bone abnormalities, such as malunions or Charcot arthropathy, may benefit from intervention by podiatric surgeons to reconstruct the foot to correct abnormal pressure points. Total contact casting may be required to off-load pressure points and allow wound healing. Infectious disease specialist care may be required for infected wounds with soft tissue contamination or osteomyelitis as well as for determining the appropriate antibiotic coverage and duration. Good blood glucose control in diabetics shortens diabetic foot ulcer healing time,[27] and involvement of an endocrinologist in a wound care center with a population of diabetic patients is essential to ensure control of blood glucose levels. Optimizing nutrition (including albumin and vitamin D) to improve healing outcomes could