Beyond Residency: The Case for Fellowship Training in Limb Salvage

The author explores the critical role of fellowship-trained podiatrists to improve outcomes.

BY ADAM R. JOHNSON, DPM

The Growing Burden of Limb Threatening Diabetic Disease

Diabetes-related limb complications remain a growing public health crisis in the United States, contributing to over 150,000 lower-extremity amputations annually. Despite advances in technology and wound care, patient outcomes continue to vary widely, depending heavily on the expertise and structure of limb preservation teams.

Diabetic foot complications are among the most devastating and costly consequences of the diabetes epidemic. The Centers for Disease Control and Prevention (CDC) reports that over 37 million Americans have diabetes, with nearly one in three developing foot ulcers during their lifetime. Of those, up to 20% will progress to major amputation. Between 2005 and 2010, diabetic foot complications accounted for approximately 962,500 inpatient admissions in the United States, with infection-related diabetic foot ulcer (DFU) admissions averaging around 45,000 per year.[1] These staggering figures underscore the frequency and severity of foot-related morbidity in diabetes and reflect not just a failure in patient education or access, but a continued need for specialized, coordinated care.

Podiatrists, with our specialized training and focus on the lower extremity, are the natural first-line defenders in this battle. However, traditional residency training—while comprehensive in surgical and biomechanical care—does not always provide the depth required for the complex, multidisciplinary decision-making inherent to limb salvage. As hospitals move toward value-based care and outcome-driven models, the need for advanced fellowship training and utilizing a multidisciplinary approach in limb preservation has never been more critical.

Dr. Rogers

According to Lee Rogers, DPM, one of the leading voices in limb preservation, advanced training not only improves individual competency but fosters a systemic understanding of team-based care, "You can't save limbs without saving systems. Fellowship training isn't just about technique; it's about becoming a leader in a high-stakes, team-driven environment."

Beyond Residency: The Case for Fellowship Training in Limb Salvage

Podiatric residencies cover a wide array of foundational skills: forefoot and rearfoot surgery, biomechanics, wound care, and basic management of diabetic complications. However, as limb preservation has evolved into its own multidisciplinary specialty, many leaders in the field have emphasized the need for post-residency specialization.

Fellowships such as those offered through the American Limb Preservation Society (ALPS) provide intensive training in:

- Vascular collaboration and diagnostics
- Advanced wound healing techniques
- Management of infection and osteomyelitis
- Surgical reconstruction and soft-tissue coverage
- Coordination of care within interdisciplinary teams

The "Toe and Flow" Model: A Blueprint for Collaborative Limb Preservation

First introduced by Drs. David Armstrong and Lee Rogers,[2] the "Toe and Flow" model revolutionized diabetic limb care by emphasizing the inseparable relationship between podiatric and vascular services. Rather than treating wounds or ischemia in isolation, this model promotes integrated care where podiatrists ("toe") and vascular specialists ("flow") co-manage the patient from admission to discharge.

Dr. Armstrong

Advanced fellowship-trained podiatrists are ideal candidates to operationalize this model. They are not only clinically skilled, but trained to lead case discussions, coordinate across

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specialties, and drive institutional pathways for limb salvage. The most successful limb preservation programs function like trauma teams: coordinated, time-sensitive, and data-driven. Fellowship-trained podiatrists serve as the glue holding these systems together.

Beyond vascular surgery, the modern limb preservation team often includes infectious disease specialists, endocrinologists, interventional radiologists, and wound care nurses. Graduates of ALPS and similar fellowships are trained to navigate and lead within these diverse teams, facilitating earlier intervention, better communication, and ultimately, better patient outcomes.

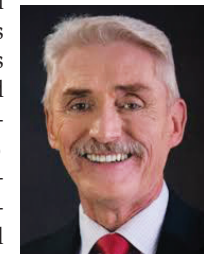
Clinical Outcomes and Institutional Value of Fellowship-Trained Podiatrists

Hospitals with structured, interdisciplinary limb preservation teams have demonstrated tangible outcome improvements.

Pomeranz, et al. reported that after implementing a limb preservation service (LPS) the major amputation rate dropped by 45.5%, from 15.4% pre LPS to 8.4% post LPS ($p = 0.001$). In addition, hospital length of stay decreased from 10.1 to 8.5 days ($p < 0.001$), and the major to minor amputation ratio declined from 22.4% to 12.7%.[3]

Hemingway, et al. performed a retrospective analysis examining the impact of implementing a limb preservation service (LPS) at a Level I trauma center over two time periods: before (2009–2013) and after (2014–2018) the LPS initiation. The study demonstrated a remarkable reduction in major amputations, decreasing from 490 cases pre-LPS to 119 cases post-LPS, representing a 76% overall decline. This significant reduction was observed across multiple indications, including trauma (95%), acute limb ischemia (90%), chronic infection (83%), chronic limb-threatening ischemia (68%), and acute infection (62%). These findings underscore the effectiveness of a dedicated multidisciplinary limb preservation program in reducing major amputations and improving limb salvage outcomes in a high-risk population. The study highlights the critical role of coordinated care pathways and specialized intervention teams in optimizing patient outcomes.[4]

Driver, et al.[5] conducted a retrospective cohort study to assess the impact of a podiatric-led limb preservation team on outcomes in patients with diabetic lower extremity complications. The study included 485 patients and compared those receiving specialized multidisciplinary podiatric care with those receiving standard care. The results highlighted the critical role that well-trained podiatrists play in early risk identification, intervention, and limb preservation. Patients with neuropathy and callus who were not in specialized care had a significantly higher risk of ulceration (20.4% vs 4.1%, $P < .0001$). Importantly, among those managed within the podiatric-led team, the proportion of amputations that were minor rather than major was significantly higher—67.3% compared to 33.7% in the standard care group ($P = .0006$). Moreover, survival outcomes were notably better in the podiatric cohort, with a survival rate of 19.5% versus 7.7% ($P < .0001$).



Dr. Frykberg

These findings underscore the value of including podiatrists at the forefront of multidisciplinary diabetic foot care teams. Their training and expertise in risk stratification, wound management, and referral coordination are directly associated with improved patient outcomes, reduced amputation severity, and enhanced survival.

Economic analyses estimate that avoiding a single major amputation saves institutions between $2,900 and $4,442 per patient,[6] with aggregate annual cost savings reaching up to $1.1 million in systems utilizing limb salvage protocols. Another study reported facility and procedural cost avoidance yielding approximately $2.85 million in annual savings post implementation of limb preservation strategies.[7]

While even general podiatric care reduces amputations compared to no podiatry involvement, fellowship-trained podiatrists bring an additional layer of expertise. Comparing hospitals with podiatric services alone versus those with fellowship-trained limb salvage leaders highlights a significant gap in depth, coordination, and efficiency. In some institutions, ALPS-trained podiatrists often serve as directors of limb preservation programs, establishing formal clinical pathways, leading amputation prevention rounds, and mentoring teams in evidence-based care protocols.

Dr. Robert Frykberg has written extensively on the clinical and economic advantages of utilizing podiatrists as frontline providers in the management of diabetic foot complications. In this role, podiatrists are uniquely positioned to identify high-risk patients early, initiate preventive care strategies, and expedite referrals for advanced interventions such as vascular evaluation or surgical management when necessary. This proactive approach not only improves clinical outcomes by reducing the incidence of major amputations but also helps curb healthcare costs associated with prolonged hospitalizations, complex surgical procedures, and long-term rehabilitation. Dr. Frykberg emphasizes that timely, podiatrist-led triage is critical to preserving limb function and improving quality of life in diabetic patients, especially given the well-documented delays that often occur in fragmented care models. He advocates for podiatrists to serve as the initial point of contact within multidisciplinary foot care teams, facilitating a more efficient continuum of care that aligns with both clinical best practices and economic sustainability.[8,9]

Culture Change: Strategic Benefits of Advanced Podiatric Training

From a leadership standpoint, cultivating fellowship-trained podiatrists offers numerous institutional advantages. As David G. Armstrong, DPM, MD, PhD, distinguished Professor of Surgery and Neurological Surgery at the University of Southern California, states,"Fellowship training in limb preservation is about far more than honing

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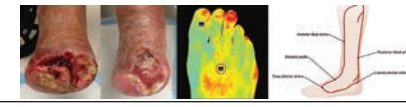

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surgical skill—it's about learning to lead teams, build systems, and create a culture where saving limbs is the expectation, not the exception. The future of amputation prevention depends on clinicians who can integrate care across disciplines, anticipate problems before they escalate, and champion pathways that deliver both better outcomes and better value."

Dr. Crisologo

These specialists are often equipped to provide clinical leadership by directing limb preservation services, organizing case conferences, and facilitating communication across departments. Organizations with robust limb salvage programs benefit from enhanced reputation building, as they attract referrals, meet community needs, and distinguish themselves as centers of excellence in diabetic care[10]. Additionally, these programs align well with evolving healthcare policies, as the Centers for Medicare and Medicaid Services (CMS) and private insurers increasingly reward value-based, coordinated care models that multidisciplinary limb preservation programs naturally support.[11]

Education and Mentorship: Cultivating the Next Generation of Limb Preservation Leaders

Another benefit of fellowship programs is their multiplier effect on the broader podiatric and medical community. ALPS fellows often go on to serve as mentors and educators, influencing residency training programs and inspiring medical students to pursue careers in limb salvage.[12]

These fellowship-trained podiatrists are often involved in:

- Residency program development
- Wound care curriculum design
- Academic publishing and speaking engagements
- Cross-disciplinary education with vascular, internal medicine, and infectious disease teams

Peter Andrew Crisologo, DPM, a rising voice in limb preservation, stresses the importance of clinical pathways and institutional structure, "A successful limb preservation program is not defined by individual expertise alone—it's built on system-wide collaboration and continuous risk stratification." These insights reinforce the need for structured training environments where podiatrists can learn both clinical excellence and team leadership.

By embedding themselves in academic and clinical settings, they shape a culture that prioritizes prevention, collaboration, and evidence-based limb care. Early exposure to this culture is vital for shaping the future direction of podiatric medicine.

A Call to the Next Generation of Podiatric Professionals

As diabetic foot complications become more complex and more prevalent, the standard of care must evolve accordingly. Advanced fellowship training and certifications in limb salvage equip podiatrists to meet this challenge, not only by sharpening clinical skills, but by positioning them as leaders within interdisciplinary teams.

To early-career residents and podiatric medical students, the message is clear: consider the path of advanced specialization. Whether through formal fellowship programs like those offered by the American Limb Preservation Society (ALPS)[12] or through respected post-residency certifications such as the Certificate of Added Qualification (CAQ)[13] in Wound Care and Limb Preservation from the American Board of Podiatric Medicine, the investment in additional training offers immeasurable returns for both your patients and your professional trajectory.

In a healthcare environment increasingly focused on outcomes, collaboration, and value, advanced training is not just an option—it's a professional imperative for those seeking to make the greatest impact. **PM**

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