# Building a Comprehensive CLI Program

The multitasking, multidisciplinary team approach to addressing this multilevel disease.

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Historically, physicians have only associated critical limb ischemia (CLI) with tibial pedal disease, but in reality, CLI tends to involve more than just tibial and pedal arteries. It is important to understand that CLI is more inclusive; it is a multivessel disease that involves multiple levels (ie, aortoiliac, femoropopliteal, and infrapopliteal).[1-3] Infrainguinal disease can be further subdivided into predominantly isolated infrapopliteal disease (approximately 33%) and both femoropopliteal and infrapopliteal disease (approximately 67%).[4-7]

Because of the complex, multilevel, multivessel presentation of CLI disease, many specialties need to work together to ensure the best possible outcome for the

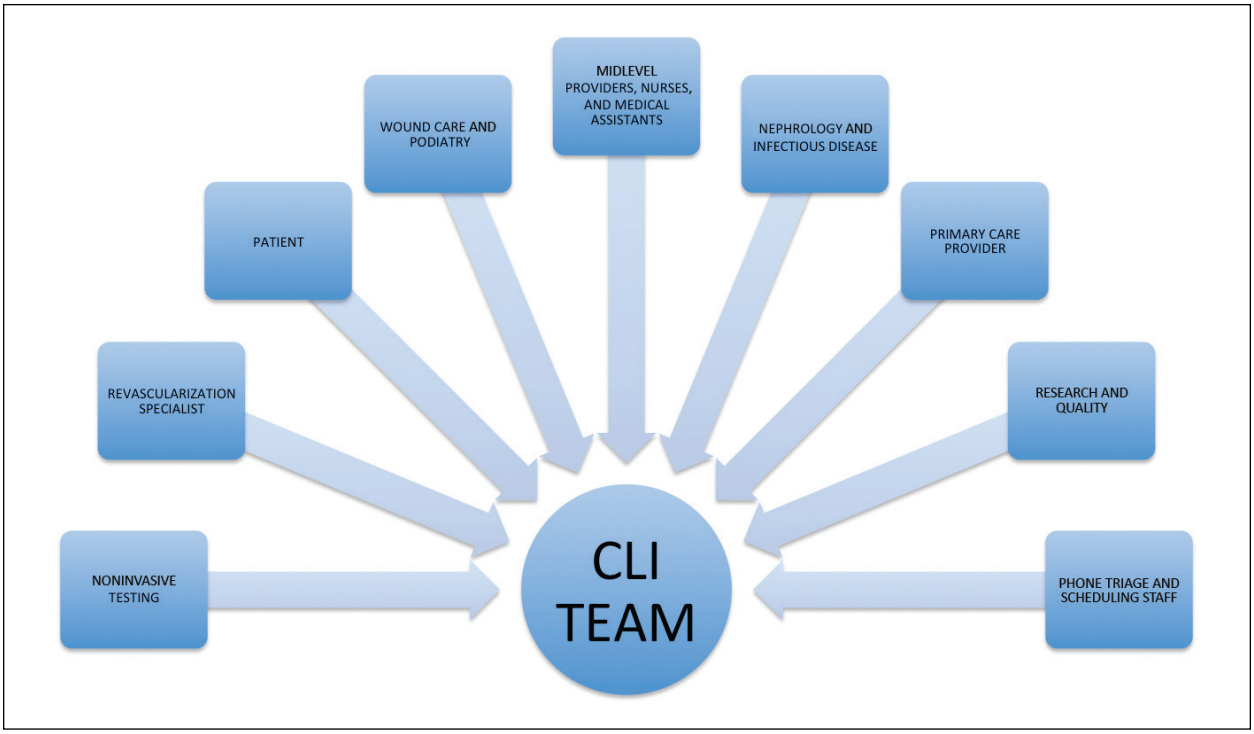


**Figure 1. A successful CLI program must include a range of team members to meet the complex needs of the CLI patient. The members may vary from institution to institution, but the concept should remain the same. The team must be comprehensive enough to cover the needs of the patient from the standpoint of primary care, diabetes, diagnosis, revascularization, wound care, infectious disease, and ongoing surveillance. The patient should never be forgotten as an integral member of the team.**

patient. Multidisciplinary CLI programs take on different formats based on each institution's focus, needs, and resources, but an overall team concept is necessary for the success of any CLI program.

## OUR INSTITUTION'S CLI PROGRAM STRUCTURE

The CLI program at our institution is constantly evolving to remain comprehensive and inclusive to keep pace with growth and advances in the field. Structuring a CLI program to remain fluid and open to change entails continuous growth and the ability to adapt to changing needs of this patient population. The program has grown to include a wide range of partners (Figure 1) who are encouraged to develop ownership of their piece of the pie. The approach by each team member comes with a high level of responsibility and attentiveness to provide comprehensive and nonduplicative care. This ownership has led to synchronized inpatient and outpatient care for our CLI patients. One unique feature of this program is that it includes the patient as a member of the team. Another unique feature is a strong quality and clinical research component, which is critical to support necessary change and growth in the program. The ability to track, benchmark, and report quality outcomes allows a program to make necessary changes to continually improve patient care, and involvement in clinical research supports a culture of inquiry within the team.

Patients can enter the team by many different means; therefore, it is imperative that each team member is familiar with the scope of practice of the other team members to allow activation of an algorithmic approach to diagnosis, therapy, and follow-up surveillance. Regularly scheduled CLI team meetings allow for case-based discussions, evaluation of program components, and feedback for improvement. Communication among the team members is facilitated by a comprehensive electronic medical record system and ongoing personal communication between team members who make themselves easily accessible to other team members.

## COMPREHENSIVE THERAPY AND POSTTHERAPY SURVEILLANCE

The superficial femoral artery (SFA) does not always receive the attention it deserves, because multilevel disease automatically diverts the attention of the operators to focus on the infrapopliteal vessels. In these patients, borderline SFA lesions (50%–70%) might go unnoticed and/or untreated. In CLI, the concept of complete revascularization should ultimately encompass the restoration of laminar flow through both inflow and outflow vessels, as their patency rates are known to affect each other in a directly proportional fashion. Hence, a goal of inline flow to the foot with < 20% residual stenosis should be considered the standard to achieve optimal perfusion of the pedal circulation.

Recently published data from the MAJESTIC,[8] IN.PACT,[9] and LEVANT[10] trials have shown excellent 1-year patency rates for drug-eluting and drug-coated technologies in the femoropopliteal segment. The SUPERSUB study[11] showed 94.1% patency rates at 1 year for TASC C and D SFA lesions in CLI patients treated with biomimetic stents. However, despite the availability of these contemporary, high-quality data, fear still exists in properly treating these lesions. The time has come to understand that it is okay to treat the SFA with confidence, to open the gates and flood the pedal circulation with proper perfusion.

Complex multilevel, multivessel disease demands rigorous postprocedural surveillance, which is another highlight of the program at our institution. To illustrate the workflow of a CLI multidisciplinary program, we present the case of a 79-year-old woman who was referred for evaluation of a serious Rutherford class 4 nonhealing wound (Figure 2). The patient was initially evaluated by the vascular team and concomitantly referred to wound care, nutritional support, primary care, infectious disease, and podiatry. Endovascular

**Figure 2. A patient presented with an advanced Rutherford class 4, nonhealing wound.**

**Figure 3. After revascularization and minor amputation, we continued with aggressive wound care.**

**Figure 4. Six weeks after revascularization and minor amputation, successful healing occurred.**

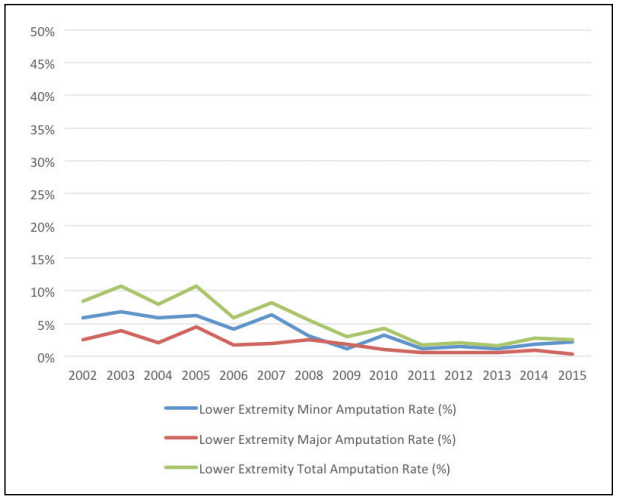


**Figure 5. As the institution's multispecialty approach to CLI evolved, a significant decrease in amputations was seen.**

revascularization of the multilevel, multivessel disease (SFA, popliteal, and tibials) was successfully completed. Given the nature of the wound, a planned, unavoidable, minor amputation was performed.

Comprehensive wound care (Figure 3) and hyperbaric oxygen therapy followed, with close surveillance and team communication. The result was successful wound healing within 6 weeks, preventing delay of rehabilitation (Figure 4). In cases such as this, the patient's social support system was crucial to successful healing and ongoing care.

The program's posthealing follow-up surveillance protocol includes a clinical exam with a handheld Doppler evaluation at 30 days, 3, 6, and 12 months, and then annually. The ankle-brachial index (and toe-brachial index when applicable) is performed at each visit, and a duplex ultrasound is performed at 30 days and then annually.

Over time, the adherence to optimal medical therapy (particularly the use of dual antiplatelet therapy and statins) has significantly improved within the program. We hope that future data will confirm our hypothesis and local observations that multidisciplinary care teams improve outcomes in CLI patients (Figure 5).

## CONCLUSION

A comprehensive CLI program must incorporate a multidisciplinary approach to ensure the best patient outcomes. Reducing amputations requires the dedication of this team to continuously improve processes and work flows in such a manner that the final result is a transitionless experience that leads to the desired outcome. ■

1. Second European Consensus Document on chronic critical leg ischemia. Eur J Vasc Surg. 1992;6(suppl A):1-32.
2. Wolfe JH, Wyatt MG. Critical and subcritical ischaemia. Eur J Vasc Endovasc Surg. 1997;13:578-582.
3. Aboyans V, Desormais I, Lacroix P, et al. The general prognosis of patients with peripheral arterial disease differs according to the disease localization. J Am Coll Cardiol. 2010;55:898-903.
4. Graziani L, Silvestro A, Bertone V, et al. Vascular involvement in diabetic subjects with ischemic foot ulcer: a new morphologic categorization of disease severity. Eur J Vasc Endovasc Surg. 2007;33:453-460.
5. Gray BH, Grant AA, Kalbaugh CA, et al. The impact of isolated tibial disease on outcomes in the critical limb ischemic population. Ann Vasc Surg. 2010;24:349-359.
6. Sadak M, Ellozy SH, Turbull IC, et al. Improved outcomes are associated with multilevel endovascular intervention involving the tibial vessels compared with isolated tibial intervention. J Vasc Surg. 2009;49:638-643.
7. Adam DJ, Beard JD, Cleveland T, et al. Bypass versus angioplasty in severe ischemia of the leg (BASIL): multicentre, randomised controlled trial. Lancet. 2005;366:1925-1934.
8. Müller-Hülsbeck S, Keirse K, Zeller T, et al. Twelve-month results from the MAJESTIC trial of the Eluvia paclitaxel-eluting stent for treatment of obstructive femoropopliteal disease. J Endovasc Ther. 2016;23:701-707.
9. Peterson S, Hasenbank M, Silvestro C, Raina S. IN.PACT Admiral drug-coated balloon: durable, consistent and safe treatment for femoropopliteal peripheral artery disease [published online October 19, 2016]. Adv Drug Deliv Rev.
10. Rosenfield K, Jaff MR, White CJ, et al. Trial of a paclitaxel-coated balloon for femoropopliteal artery disease. N Engl J Med. 2015;373:145-153.
11. Palena LM, Diaz-Sandoval LJ, Sultato E, et al. Feasibility and 1-year outcomes of subintimal revascularization with Supera stenting of long femoropopliteal occlusions in critical limb ischemia: the "Supersub" study [published online November 12, 2016]. Catheter Cardiovasc Interv.

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