

INTERVIEW

The Economic Costs and Patient Consequences of Amputation as a Treatment for Critical Limb Ischemia

An Interview With Mary Yost, MBA

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At the 2024 Amputation Prevention Symposium, Mary Yost, MBA, president and cofounder of The Sage Group, spoke with Vascular Disease Management about her AMP 2024 presentation on the consequences of amputation as a treatment for patients with critical limb ischemia (CLI). She discussed not only the impact of amputation on patients' lives but the economic impact as well. Below is an edited transcription of the video she recorded for us at AMP, which you can watch [here](#).



Mary Yost, MBA
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Amputation has both very costly outcomes and very poor patient outcomes. There are a number of ways to look at the cost. If we look at patient costs in the hospital, we have to look at total costs, which are the initial procedure cost plus the cost of morbidity, mortality, and revision procedures. If we look at those costs, we're looking at \$40,000 vs \$26,000 to \$27,000 for endovascular or bypass. Another way to look at costs is patient cost per patient year. If we look at those [costs] in Medicare, it is around \$56,000 per patient year for an amputee vs around \$49,000-plus for someone who undergoes endovascular or bypass. We have around 200,000 amputations performed for CLI annually; around 65,000 or 70,000 of these are major amputations, that is, above the knee or below the knee.

The direct costs by themselves are \$33 billion. There is another \$11 billion in lifetime costs, and there are even more costs beyond that, which have to do with caregiving and unreimbursed patient deductibles. Caregiving itself can cost up to \$350,000; it's probably higher now because that is a number from a couple years back. We also have the cost of lost productivity, both for the amputee and the caregivers, and of course there is lost productivity for death. And all those costs are paid for. They are looked at as economic costs cost to society. And in that regard, who pays the bill? It's Medicare and Medicaid. It's about 80%. In other words, we the taxpayers are paying this bill. I already discussed that amputation in the hospital costs more to perform than does a limb salvage procedure. If we look at data from other countries and other time frames, whether it's Singapore or Australia or various other countries, all the data has shown that an amputation procedure in the hospital costs more than a limb salvage no matter what the country or the time frame.

We can also look at cost in terms of, is amputation cost-effective? Well, it turns out it's not. Amputation is not cost-effective. There are a number of studies, older studies—this an area that we do need more research on—but what the studies have shown is that amputation is not cost-effective vs bypass vs endovascular. There were a series of studies that were done looking at amputation in Rutherford category 5 patients with ulcers. They looked at different subcategories, and one of the most interesting outcomes of this study was they looked at the so-called marginal patients. These are the frail, elderly patients who have limited mobility. Conventional wisdom states that these patients are better off with amputation, and that's completely incorrect. Cost-effectiveness analysis shows that these patients are actually better off with limb salvage.

The key metrics here are that with amputation, [patients] have lower health benefits and higher costs, specifically the cost of nursing home and rehab facilities, which are very high. If we move on and look at patient outcomes, there are different ways to look at those patient outcomes. Within the hospital, there are a whole series of outcomes we can look at, from mortality to revision procedures to

length of stay, etc. And all of those patient outcomes are worse with amputation. Let's take mortality—I mean, who wants to die? This is within 30 days of the procedure. If you're the patient, you have a 9% chance of dying in the hospital vs way less than 1%, about a half percent, a little bit more, a half percent for endovascular and a little bit higher for bypass, so well less than 1%.

With amputation, there is a huge list of very serious complications. A patient undergoes this procedure, and they have a very high risk of wound infection, respiratory infection, sepsis, really serious complications. If you compare the list of complications with endovascular and bypass, there is a much lower frequency of serious adverse consequences to having this procedure. If you look at length of stay, it is significantly less with endovascular and bypass. Nobody wants to stay in the hospital. The chance of having a revision procedure to a major amputation is much, much higher with a below-knee amputation (BKA) or an above-knee amputation (AKA) than it is with endovascular or bypass. There are various other metrics, but however you look at it, the patient outcomes in the hospital are much poorer.

We can also look at discharge destination. Where does the patient go after the hospital? After an AKA or BKA, between two-thirds and three-quarters of the patients are discharged either to a nursing home, rehab facility, or some other facility. They don't go home routinely; less than 30% go home routinely. It's the exact opposite with endovascular, with limb salvage. I believe it's close to two-thirds, three-quarters of those patients go home routinely. This is something else that's very important from the patient's point of view. Then looking at longer term, thinking about what is important to the patient and the patient's family—it's survival, the ability to walk, and the ability to live independently. If you look at those metrics and compare amputation with limb salvage, whether it's at short term or 2 years, all those metrics are much worse. [The patient has] less ability to walk, less ability to live independently, much less ability to do things that they want to do, etc. So again, that's another comparison. Even beyond all those outcomes, we have a list of very specific amputation-related outcomes that are really abysmal. There's a very lengthy healing process; it takes very long to heal. Patients have a very poor quality of life; they view themselves as very severely impaired. One recent study found that almost 100% had problems with just the basic tasks of daily living, whether it was eating or bladder and bowel control. We have major falls in 18%, and those are just the documented major falls. We have limb pain in almost 100%, not just phantom limb pain, but residual limb pain in the other limb and back pain in 50%, 60%, 70% of these patients.

We have problems with stump healing, which reduces the ability to use a prosthetic. In fact, very few of these patients actually are fitted for a prosthetic; in fact, a little bit more than a third are actually fitted. And the first, the most common reason, is death. We have cardiovascular events and that type of thing, or another amputation. So however you look at it, the outcomes with amputation are really poor. If you think about it from the patient's point of view, if the patient and/or the patient's family knew all this, would they want to have an amputation if there was a possibility for limb salvage? The disease is being diagnosed and treated at later stages. Patients are not referred to vascular specialists. If a patient is referred to a vascular specialist, they have a much higher probability of having an angiogram, it's been shown that an angiogram reduces the odds of amputation by 90%. If they're referred to a specialist, they have much better odds of being revascularized before an amputation. So many of these patients just directly go to primary amputation. They never have an angiogram, they never have a revascularization. And that is truly tragic, and not adequate treatment at all. I would call it “mistreatment” of these patients.

We also have a huge lack of knowledge and awareness amongst the non-specialist physicians, and primary care physicians routinely misdiagnose this. A patient survey found that 70% or so of patients, who were just peripheral arterial disease (PAD) patients, were misdiagnosed; their leg symptoms were attributed to old age. That's a favorite, old age—neuropathy, arthritis, everything other than PAD. Another factor is that patients themselves—nobody's ever heard of PAD, nobody's ever heard of CLI. If you haven't heard of PAD, you are not going to search for it on the internet to find out what can be done for it. There is a huge need for education of non-specialists; and when I say non-specialists I mean nonvascular specialists such as interventional cardiologists, interventional radiologists, and vascular surgeons; even the nephrologists and diabetologists routinely do not diagnose the disease, and their patients are very high up on the list of likely to have PAD and then go on to CLI. So it's multifactorial. ■

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[The Current U.S. Prevalence of Peripheral Arterial Disease](#), by Mary Yost, MBA

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