

# People in their 50s with PAD found to be at higher amputation risk than older people after leg surgery

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Credit: Lynn Greyling/public domain

People in their 50s with severe [peripheral artery disease or PAD](#) may be more likely than people in their 80s to undergo leg amputation one to five years after emergency surgery to restore blood flow to the lower limbs, according to new research published in [Circulation](#).

PAD occurs when the arteries leading away from the heart narrow due to cholesterol deposits, preventing adequate blood flow throughout the body—commonly the lower extremities. The condition is estimated to affect 10 million to 12 million adults ages 40 and older in the U.S., according to 2024 [guidelines](#) from the American Heart Association and the American College of Cardiology.

Symptomatic PAD is characterized by painful muscle cramping in the hips, thighs, calves, or feet when walking, climbing stairs or exercising. The pain does not subside with rest. Modifiable risk factors for PAD include being a smoker, or former smoker, having diabetes, hypertension and/or abnormal cholesterol.

"People with severe forms of PAD requiring urgent [surgery](#) tend to have extremely poor disease progress. They are at high risk of limb loss and all-cause death following the initial surgery," said study lead author Qiuju Li, Ph.D., a research fellow in medical statistics at the London School of Hygiene and Tropical Medicine in the United Kingdom.

"Our primary finding is different from the traditional belief that older people were at an increased risk of major amputation. Our study, interestingly, shows the opposite relationship."

This study analyzed previous data from nearly 95,000 adults older than age 50 with PAD who had surgery to restore blood flow (known as revascularization) between 2013 and 2020 in England. The analysis projected the possibility of major limb amputation and death after revascularization. Major limb amputation was defined as [leg amputation](#)

above the ankle.

Two-thirds of participants in the data review had undergone surgery to restore blood flow during an elective hospital admission, while the remainder had non-elective surgery during an emergency hospital admission. The analysis noted that:

- The risk of major amputation among emergency admissions among patients between 50- to 54-years-old was 18% one year after revascularization and 28.8% five years after the surgery.
- The risk of major amputation under the same circumstances for patients between ages 80 and 84-years-old was 11.9% at one year and 17% at five years.
- Among patients who underwent a revascularization during an elective hospitalization, the risk of major amputation remained comparatively low regardless of the patient's age: 10.8% for those 50- to 54-years-old, and 6.5% for those 80- to 84-years-old at five years.
- However, the risk of death without a major amputation increased substantially among older patients after both elective and non-elective revascularizations: 48.7% and 58.9%, respectively, for patients between ages 80–84 at five years, vs. 12.9% and 16.9%, respectively, for those ages 50–54 at five years.
- After major amputation, the data showed participants were at an increased risk of death if they had undergone major amputation within six months of the revascularization.
- More specifically, for participants between ages 80–84, the 1-year death rates after major amputation were 39.2% and 29.8% if they underwent major amputation at three months and one year, respectively, after revascularization, whereas the corresponding death rates were 20.3% and 14.9%, respectively, for those between ages 50 and 54.

"The findings also highlight how the association between the illness trajectories and patient characteristics is not straightforward," Li said.

"While being older at the time they had blood flow-restoring surgery was associated with a marked increase in the risk of death, the risk of major amputation after that surgery was lower among older patients rather than younger patients."

In May 2024, joint guidelines from the American Heart Association, the American College of Cardiology and nine other medical societies highlighted the importance of early diagnosis and treatment to prevent amputation and other cardiovascular complications from lower extremity PAD. The guidelines also called for coordinated care from a multispecialty team to treat the condition.

"This study shows that for patients with severe peripheral arterial disease, there is not one simple answer that can explain each patient's condition," said guidelines co-vice chair Philip Goodney, M.D., M.S., professor and section chief of Vascular Surgery at Dartmouth Health in New Hampshire.

"For example, patients with severe disease who present at young ages have poor outcomes, irrespective of how they might be treated. This may be the result of severe disease or difficult circumstances for treatment. Either way, this information can help guide clinicians and researchers in determining the best treatments for these high-risk individuals.

"Similarly, the study also shows that older patients with moderate to severe disease can have good results when trying to prevent an amputation. Overall, these findings make it clear—in treatment for PAD, it is not 'one size fits all.'"

This analysis had several limitations that may have affected the results. The data review did not account for subsequent surgeries to restore

blood flow after the initial surgery; it could not account for disease severity or whether amputation occurred on the leg that underwent the initial surgery or the other leg; and race or ethnicity was not considered due to unreliable information from the database.

#### Study details and background:

- The data review included 94,690 people with PAD who underwent surgery to restore [blood flow](#) to the lower limbs between April 2013 and March 2020 in England.
- Participants were ages 50 and older, the median age was 72 years and 66% of participants were men.
- Data was collected from the Hospital Episode Statistics Admitted Patient Care database in England.
- A [statistical model](#) was created from the data to describe patterns of survival after an initial lower limb revascularization; if and when patients experienced major amputation; and survival after amputation.
- In total, 10.0% patients underwent major [amputation](#) during the follow-up period, which ended in March 2021. Of these, two thirds were emergency patients at time they were admitted to the hospital, and more than half had died by the end of study.
- The revascularization procedure was labeled elective if performed during an elective admission, and non-elective if performed during an emergency admission or after transfer from another hospital.

**More information:** Illness Trajectories After Revascularization in Patients With Peripheral Artery Disease: A Unified Approach to Understanding the Risk of Major Amputation and Death, *Circulation* (2024). [DOI: 10.1161/CIRCULATIONAHA.123.067687](https://doi.org/10.1161/CIRCULATIONAHA.123.067687)

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