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## Heart Pumps: High Cost, High Mortality In An Emerging Technology

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Their study found that only half of all patients who received a VAD were alive one year later.

"This study tells us two things," says Adrian Hernandez, M.D. a cardiologist at Duke and the lead author of the study. "VADs are an emerging technology and while they have been proven effective in extending life, more needs to be done before they can be more widely adopted in patients with heart failure. Also, as physicians, we need to do a better job defining the time of optimal intervention and identifying who is most likely to benefit from a VAD."

Researchers analysed data on nearly 3,000 Medicare patients who received a VAD between 2000 and 2006, measuring hospitalisation and death rates and tracking inpatient costs. Half the patients received a VAD as a primary strategy for treatment of heart failure and the other half received a VAD after cardiac surgery.

Among the primary group, 55 percent of patients were discharged alive with a VAD after a median hospital stay of 30 days. By one year, 20 percent of the primary group had undergone transplant, 5 percent had the device removed, 42 percent had died and 32 percent were alive with the device.

In the post-surgical group, a third were discharged alive with a device, and the median hospital stay was 10 days. At one year, a quarter of the group was alive with a VAD in place.

Investigators also found that care did not end with the initial hospitalisation. About half the patients in both groups had to be re-hospitalised within six months. Mean Medicare hospital costs for the primary group neared \$200,000, but the cost for patients in the post-surgery group was closer to \$100,000.

"The figures are somewhat discouraging, but we have to remember that all of these are very high-risk patients to begin with. They were elderly and in grave condition because of their failing hearts. Without a VAD, they probably would not have survived," says Hernandez.

The average age of the patients was 63 in the primary group and 69 in the post-surgery group. Hernandez says survival rates are somewhat better among younger, healthier patients.

The study also suggests that outcomes may depend, in part, on where VAD procedures are performed. Researchers identified 570 hospitals that implanted VADs, but more than half the hospitals implanted only one VAD per year. As with other surgical procedures, volume appears to matter. Higher volume was significantly associated with lower risk of death, with risk of death 31 percent lower in hospitals performing at least five procedures per year.

"This suggests there may be an opportunity to improve outcomes by simply organising VAD care around centers with significant experience," says Hernandez. "It may make sense to designate certain hospitals as 'centers of excellence,' where VAD procedures are routine and patients could benefit from their expertise."

The study is the first to examine trends in the use of assist devices after Medicare moved in 2003 to expand their use among elderly patients with certain end-stage characteristics. While it may raise questions about the value of using expensive, high-end technologies in fragile patients at the end of life, Hernandez says it would be short-sighted to dismiss VADs as too risky. "As a technology, VADs are still evolving. We have a lot to learn about how to use them and when to use them. As our collective experience grows, we feel confident that patients' outcomes will improve."

Lesley Curtis, PhD, a health services researcher in the Duke Clinical Research Institute and senior author of the study, says the study also points to a growing need to balance the development and use of new technologies in an era of limited resources. "This is not about turning away from a promising new technology. It's about choosing the right patient for the right device at the right time."

Additional authors include Eric Peterson, Kevin Schulman, Christopher O'Connor, Joseph Rogers, Carmelo Milano, Alisa Shea and Bradley Hammill, all from Duke.

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