

Remote, real-time monitoring of post-operative lung transplant patients significantly decreases hospital stays

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The Keck Medicine of USC lung transplant team that authored the study includes left to right: Jaynita Patel, MS,RD, Tammie Possemato, Felicia Schenkel, MSN, Roya Sadeghi, RN, Jeremy O'Conner, MSW, LCSW, Marian Duong, RD, Maria Bembi, RN, and Sivagini Ganesh, MD, MPH. Not pictured:

Mark L. Barr, MD. Credit: Joyce Lee

For many with end-stage lung disease, lung transplantation has become a viable option to extend lives and improve the quality of life.

However, once [lung transplant](#) recipients leave the hospital, they may experience complications, such as an infection or [organ rejection](#), that can result in unplanned hospital readmissions and other poor outcomes.

One of the many challenges patients face is managing their health from home and adhering to medication schedules.

To provide another layer of support for lung transplant recipients, the Keck Medicine of USC lung transplant team launched a two-year observational pilot study to monitor patients post-discharge using Bluetooth-enabled devices and computer tablets. The devices measured [blood pressure](#), [heart rate](#), weight, blood glucose, oxygen saturation and pulmonary function.

The researchers discovered that monitored patients had 44% fewer hospital readmissions and spent 54% fewer days in the hospital when they were readmitted.

"This study is significant because it is the first to use Bluetooth technology to comprehensively monitor transplant patients," says Felicia Schenkel, MSN, lung transplant manager and lead author of the study.

"Lung transplant recipients are a high-risk patient population, and we're happy to see that this program worked so well to improve patients' lives."

The study appeared in the *American Journal of Transplantation*.

Twenty-eight lung transplant patients received the two-year remote tracking and 28 matched control patients did not. With the exception of remote monitoring, all patients received the same level of post-surgical care, which included regular in-person visits and lung function check-ups. The two groups of patients were also similar in respect to demographics, diagnosis and pre-transplant clinical characteristics.

Monitored patients used computer tablets to report symptoms, track appointments and medication compliance, conduct videoconferences with staff and access educational videos along with other materials.

Patients were asked to measure their vital signs and report symptoms daily for the first three months and after that time, three times a week. The results were sent in real time to the transplant team and triggered alerts if out of normal range.

Patients with high compliance rates on reporting vital signs and symptoms received incentives such as badges and humorous memes. Patients with marginal compliance received encouraging reminders and periodic calls from the transplant team.

At the end of the two years, the tracked patients were readmitted to the hospital 66 times versus 112 for the control group. They were less likely to be admitted for infections and non-organ rejection/non-infection causes such as shortness of breath or hypertension. They also had a lower but not statistically significant readmission for organ rejection and for death.

In addition, when monitored patients were readmitted to the hospital, they spent an average of 12 fewer days per patient per year compared to the control group (approximately 10 days versus 22). Hospital costs were also dramatically cut by 48%, translating to a \$132,000 reduction in [hospital](#) charges per patient per year.

The at-home tracking worked for two reasons, according to Schenkel. "With constant monitoring, we were able to react to data sooner and take intervening steps before a patient's condition worsened," she says. "In addition, because we incentivized data reporting, patients were more likely to check in with us about their health and report symptoms."

Post-surgical remote monitoring is now standard protocol for all lung transplant recipients at Keck Medicine. The department averages between 30—40 lung transplants per year.

In the future, study authors hope other medical teams will follow their lead.

"Real-time remote monitoring of patients is not only beneficial to lung [transplant patients](#) but can easily be transferred to other types of transplant or critical care patients," Schenkel says. "This program should be a model for how telemedicine can be used in the future, especially as the need for remote monitoring technology has increased due to the COVID-19 pandemic."

More information: Felicia A. Schenkel et al, Use of a Bluetooth tablet-based technology to improve outcomes in lung transplantation: A pilot study, *American Journal of Transplantation* (2020). [DOI: 10.1111/ajt.16154](#)

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