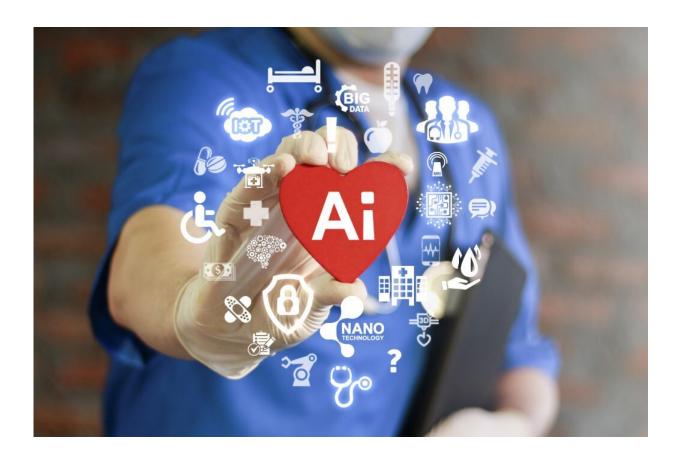# AI algorithm can predict long-term patient survival after cardiac surgery, study finds

December 1 2021

Credit: Mayo Clinic

A novel artificial intelligence (AI) algorithm that identifies a cardiac dysfunction from a single-lead EKG also can predict long-term patient survival after cardiac surgery, according to new research from Mayo

Clinic.

The study, published in *Mayo Clinic Proceedings*, finds that an [algorithm](#) that previously has shown it can detect patients with reduced left ventricular ejection fraction also may predict [long-term mortality](#) after cardiac surgery, making it a potentially [valuable tool](#) for assessing risk as patients and their [health care providers](#) consider surgery.

"Our study finds there is a clear correlation between long-term mortality and a positive AI ECG screen for reduced ejection fraction among patients without apparent severe cardiomyopathy," says Mohamad Alkhouli, M.D., a Mayo Clinic cardiologist and the study's senior author. "This correlation was consistent among patients undergoing valve, coronary bypass, or valve and coronary bypass surgery."

The retrospective study involved reviews of 20,627 patients at Mayo Clinic in Rochester from 1993 to 2019. The patients underwent coronary artery bypass grafting, valve surgery or both, and they had a left ventricular ejection fraction of more than 35%. Of these patients, 17,125 had a normal AI EKG screen and 3,502 had an abnormal screen. Patients with an abnormal screen tended to be older with more comorbidities.

The algorithm was applied to the most recent EKG the patients had within 30 days before surgery. Baseline characteristics, as well as in-hospital, 30-day and long-term mortality data, were extracted from the Mayo Clinic cardiac surgery database.

Probability of survival at five years was 86.2% for patients with a normal screen versus 71.4% for those with an abnormal screen. The 10-year probability of survival was 68.2% and 45.1%, respectively, for the two groups.

"Our study documented the algorithm's prognostic value in predicting long-term, all-cause mortality after cardiac surgery," says Dr. Alkhouli. "The analysis showed that an abnormal AI screen was associated with a 30% increase in long-term mortality after valve or coronary bypass surgery. For clinicians, this may aid in risk stratification of patients referred for surgery and facilitate shared decision-making."

The study is believed to be the first large-scale research to explore the usefulness of AI algorithms with a single EKG to better predict cardiac surgery outcomes. Because the algorithm uses a routine and relatively inexpensive test, it could be applied widely after validation.

Additional studies are underway to determine whether the information provided by the algorithms can improve diagnosis, decision-making and clinical outcomes. The use of AI-based tests in cardiology is becoming more common in academic health care centers, and the results of this study may encourage more providers to consider their clinical significance.

  More information: Abdulah A. Mahayni et al, Electrocardiography-Based Artificial Intelligence Algorithm Aids in Prediction of Long-term Mortality After Cardiac Surgery, *Mayo Clinic Proceedings* (2021). DOI: 10.1016/j.mayocp.2021.06.024

Provided by Mayo Clinic