To the Editor: Aortic stenosis (AS) is one of the most common valvular heart diseases with insidious progression and significant morbidity. Because of the deleterious effect of the valve disease on the myocardium, early valve intervention is now recommended before the onset of symptoms, emphasizing the importance for detecting these individuals with AS early. Although current diagnostic approaches are technology-intensive with advanced imaging techniques, there remains a demand for an effective, inexpensive screening strategy for this clinical entity.

Groups at our institution have applied artificial intelligence (AI) to the standard 12 lead electrocardiogram (ECG) to detect multiple pathologies including moderate to severe AS. These AI-ECG models have been linked to the electronic health record allowing providers in the Mayo Clinic practice to view AI-ECG algorithm results for all clinic obtained 12 lead-ECGs in real time for multiple cardiac pathologies.

We describe an elderly patient who presented to the hospital with a syncopal episode and acutely decompensated heart failure in the setting of critical AS. He had a known systolic murmur since 2002 and multiple ECGs, but no cardiac imaging had been performed. The AI-ECG algorithm for AS revealed an increased probability of clinically relevant aortic valve disease since 2010 (0.469; above the diagnostic threshold selected for similar sensitivity and specificity) with increasing likelihood of disease on subsequent ECGs (Figure). This case represents an excellent example of how the AI-ECG algorithm for AS may fit in clinical practice, as this patient’s clinically relevant AS was detected on AI-ECG years before his clinical decline.

To better understand innerworkings of the AI-ECG algorithm, saliency mapping showed T-P interval length and precordial T-wave/U-wave morphology were the most influential factors impacting AS probability, whereas “typical” ECG findings associated with late AS (ie, left ventricular hypertrophy/QRS complex changes) were not heavily weighted by the algorithm. From review of the patient’s prior ECGs, it follows that the probability for AS increased as there were

![Graph showing probability of aortic stenosis over time](image)

**FIGURE.** A, Artificial intelligence electrocardiogram (AI-ECG) determination of AS over time. Each circle represents an ECG obtained by a Mayo Clinic provider. The dotted blue line indicates clinical diagnostic threshold. Circles above the diagnostic threshold are colored blue indicating increased probability of clinically relevant disease. Circles below the diagnostic threshold are colored green indicating decreased probability of clinically relevant disease. Exact, algorithm-derived probability of disease values are in parenthesis. B, Doppler aortic valve gradient (78 mmHg) calculated by transthoracic echocardiogram during 2021 hospital presentation. AS, aortic stenosis; AV meanPG, aortic valve mean pressure gradient.
changing T-P segments (secondary to lengthening PR intervals) and subtle T-wave changes in the precordial leads over the years.

The algorithm for AS detection boasts fair sensitivity, specificity, and accuracy (78%, 74%, and 74%, respectively). However, the algorithm also has a positive predictive value of 10.5% with an AS prevalence 4% forewarning that positive AI-ECG results must be interpreted within the clinical context (ie, risk factors/symptoms/physical exam) to avoid unnecessary testing. In these patients with valve disease, the presence of a murmur on physical examination and increasing probability of AS detection on sequential ECGs should prompt the performance of an echocardiogram.

The AI-ECG algorithm for AS may have aided in a decision for cardiac imaging before this patient’s critical presentation. This is an excellent example of how the AI-ECG for AS could be used as an inexpensive, rapid screening tool in the correct clinical context, particularly as this technology is available to providers throughout our health care system. However, a cautious approach including broad, prospective clinical investigation is necessary to validate the true utility and appropriate application of this AI technology.

**POTENTIAL COMPETING INTERESTS**
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