Relevance and feasibility of artificial intelligence-assisted echocardiography for left ventricular ejection fraction assessment in geriatric patients

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Abstract

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Background: Left ventricular ejection fraction (LVEF) assessment through echocardiography is crucial for heart failure (HF) diagnosis and therapeutic strategy. However, access to echocardiography is limited in geriatric units. This study aimed to assess the relevance of AI-assisted automated LVEF measurement (AutoEF-AI) in geriatric patients compared to standard echocardiography, as well as its feasibility when performed by a geriatrician with limited echocardiography training.

Method: 136 patients hospitalized for acute heart failure in geriatric units were prospectively included. Each patient underwent standard echocardiography by an expert cardiologist (reference method) and AutoEF-AI echocardiography by a geriatrician. The AutoEF-AI approach combined acquisition of image with real-time guidance via a handheld device and the Us2.AI analysis software for LVEF measurement. The geriatrician underwent a one-day training session to learn how to perform apical 2- and 4-chamber views. The correlation between the two methods was assessed using intraclass correlation coefficient (ICC), Spearman's rank correlation, kappa coefficient and Bland-Altman analysis. Diagnostic accuracy for detecting LVEF <50% was calculated. A multiple linear regression model was constructed to identify potential explanatory variables of the discrepancy between the two measurements.

Results: The analysis demonstrated excellent agreement between AutoEF-AI and the reference methods (ICC = 0.96, 95% CI: 0.92-0.97, r = 0.97, P < 0.001, 0.79; mean bias 1.31% with limits of agreement: -5.89%, 8.51%). AutoEF-AI identified abnormal LVEF (EF <50%) with 99 % sensitivity, 89% specificity, and 93% total diagnostic accuracy. Multiple linear regression analysis revealed that the presence of a pacemaker was significantly associated with a difference in LVEF measurements (p = 0.038).

Conclusion: AutoEF-AI echocardiography yielded results similar to the reference method, indicating its potential utility in geriatric departments, even when performed by geriatrician with limited echocardiography training.

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