

# Automatic Tablet-Based Monoplane Quantification of Stroke Volume and Left Ventricular Ejection Fraction: A Comparative Assessment against Computer-Based Biplane and Monoplane Tools

P. Bingley<sup>1</sup>, S. Bouwmeester<sup>2</sup>, S.E.A. Felix<sup>2</sup>, Leon. J. Montenij<sup>1</sup>, Arthur Bouwman<sup>1</sup>, and Frederique Raat<sup>1</sup>

<sup>1</sup>Technische Universiteit Eindhoven Faculteit Electrical Engineering

<sup>2</sup>Catharina Ziekenhuis Afdeling Cardiologie

July 16, 2024

## Abstract

**Purpose:** Point-of-care cardiovascular left ventricle ejection fraction (LVEF) quantification is established, but automatic tablet-based stroke volume (SV) quantification with handheld ultrasound devices is unexplored. We evaluated a tablet-based monoplane LVEF and LV volume quantification tool (AutoEF) against a computer-based tool (Tomtec) for LVEF and SV quantification. **Methods:** Patients underwent handheld ultrasound scans, and LVEF and SV were quantified using AutoEF and computer-based software that utilized either apical four-chamber views (AS-mono) or both apical four-chamber and apical two-chamber views (AS-bi). Correlation and Bland-Altman analysis were used to compare AutoEF with AS-mono and AS-bi. **Results:** Out of 43 participants, 8 were excluded. AutoEF showed a correlation of 0.83 [0.69:0.91] with AS-mono for LVEF and 0.68 [0.44:0.82] for SV. The correlation with AS-bi was 0.79 [0.62:0.89] for LVEF and 0.66 [0.42:0.81] for SV. The bias between AutoEF and AS-mono was 4.88% [3.15:6.61] for LVEF and 17.46 ml [12.99:21.92] for SV. The limits of agreement (LOA) were [-5.50:15.26]% for LVEF and [-8.02:42.94] ml for SV. The bias between AutoEF and AS-bi was 6.63% [5.31:7.94] for LVEF and 20.62 ml [16.18:25.05] for SV, with LOA of [-1.20:14.47]% for LVEF and [-4.71:45.94] ml for SV. **Conclusion:** LVEF quantification with AutoEF software was accurate and reliable, but SV quantification showed limitations, indicating non-interchangeability with neither AS-mono nor AS-bi. Further refinement of AutoEF is needed for reliable SV quantification at the point of care.

## Hosted file

Final\_AutoEF\_manuscript.docx available at <https://authorea.com/users/804605/articles/1192108-automatic-tablet-based-monoplane-quantification-of-stroke-volume-and-left-ventricular-ejection-fraction-a-comparative-assessment-against-computer-based-biplane-and-monoplane-tools>