

Use of Artificial Intelligence by Medical Students to Enable Accurate Point-of-Care Echocardiographic Assessment of Left Ventricular Ejection Fraction

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PURPOSE

A prospective study of POCUS operated by medical students using an AI-based tool to evaluate the left-ventricular ejection fraction (LVEF) of patients hospitalized in a cardiology department.

METHODS

Nine students were trained (6-hr session) using a hand-held ultrasound device (Vscan Extend) equipped with LVivo EF, an AI-based tool that automatically evaluates LVEF. The clips were assessed for LVEF by three methods (Fig 1): visually by the students, students + AI tool, and experienced cardiologists. LVEF measurements were compared to a formal echocardiogram (within 24-hrs) evaluated for LVEF using the Simpson method and eyeballing assessment by two expert echocardiographers.

FIGURE 1. LVEF ASSESSMENT METHODS

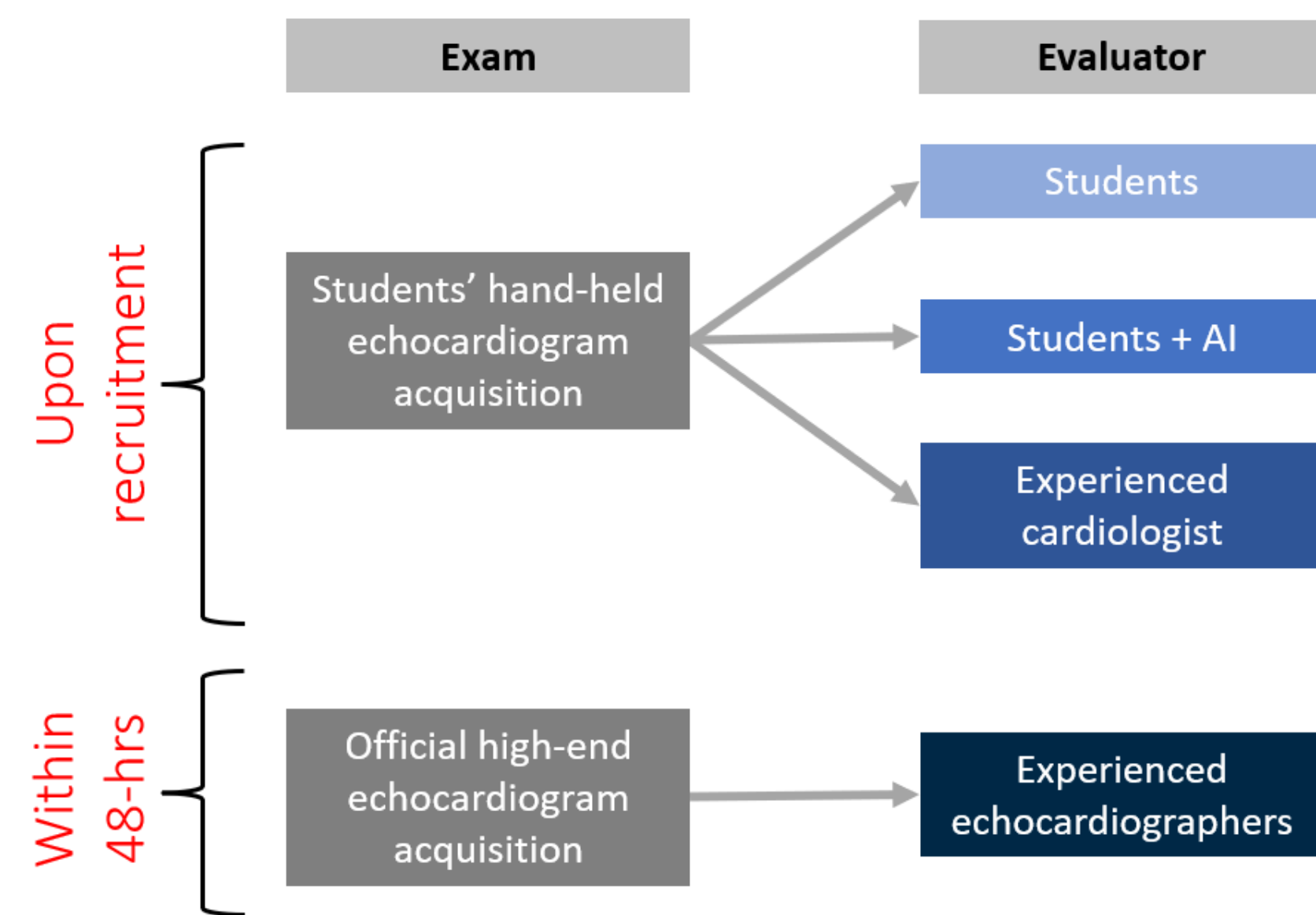
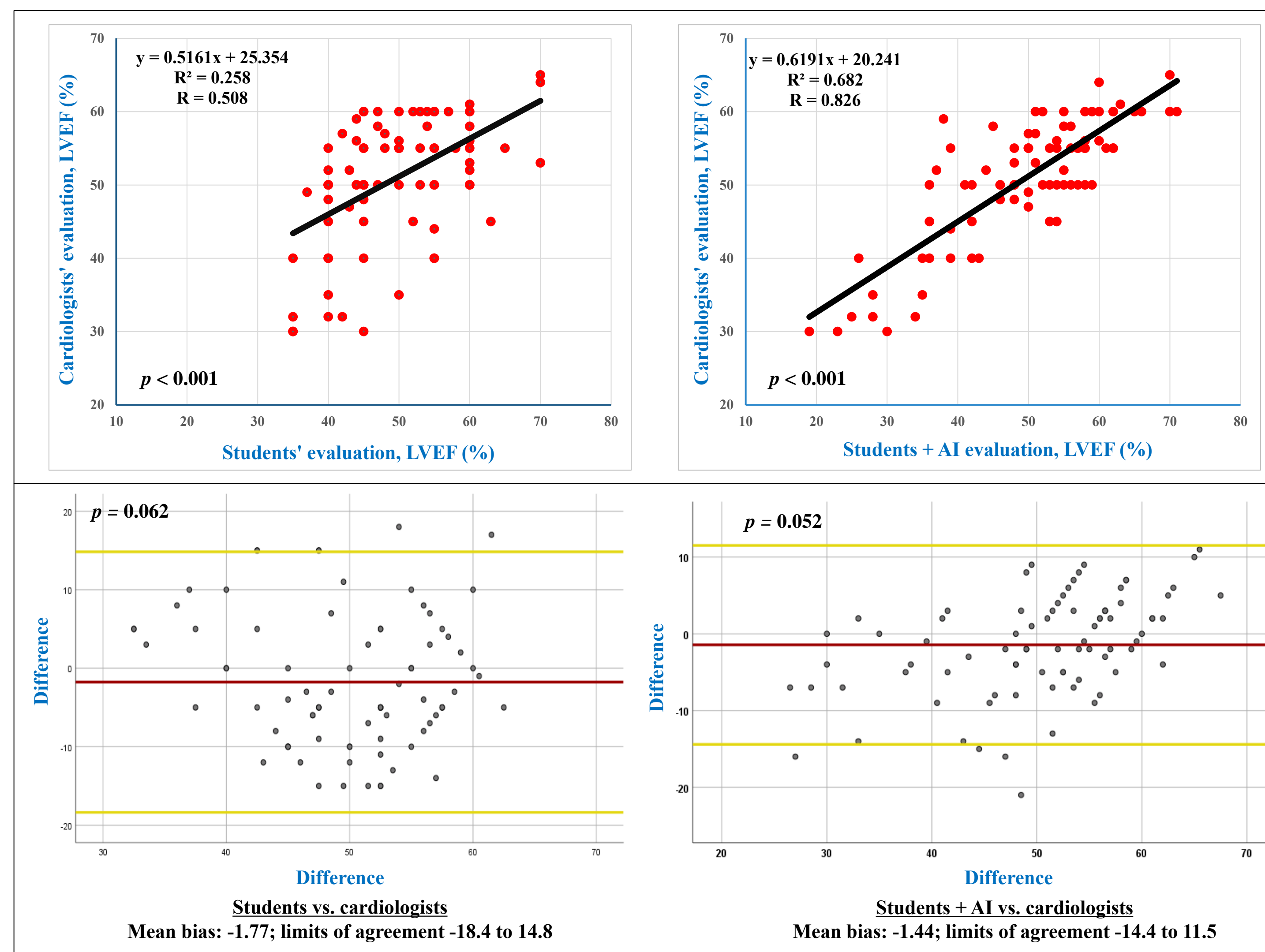


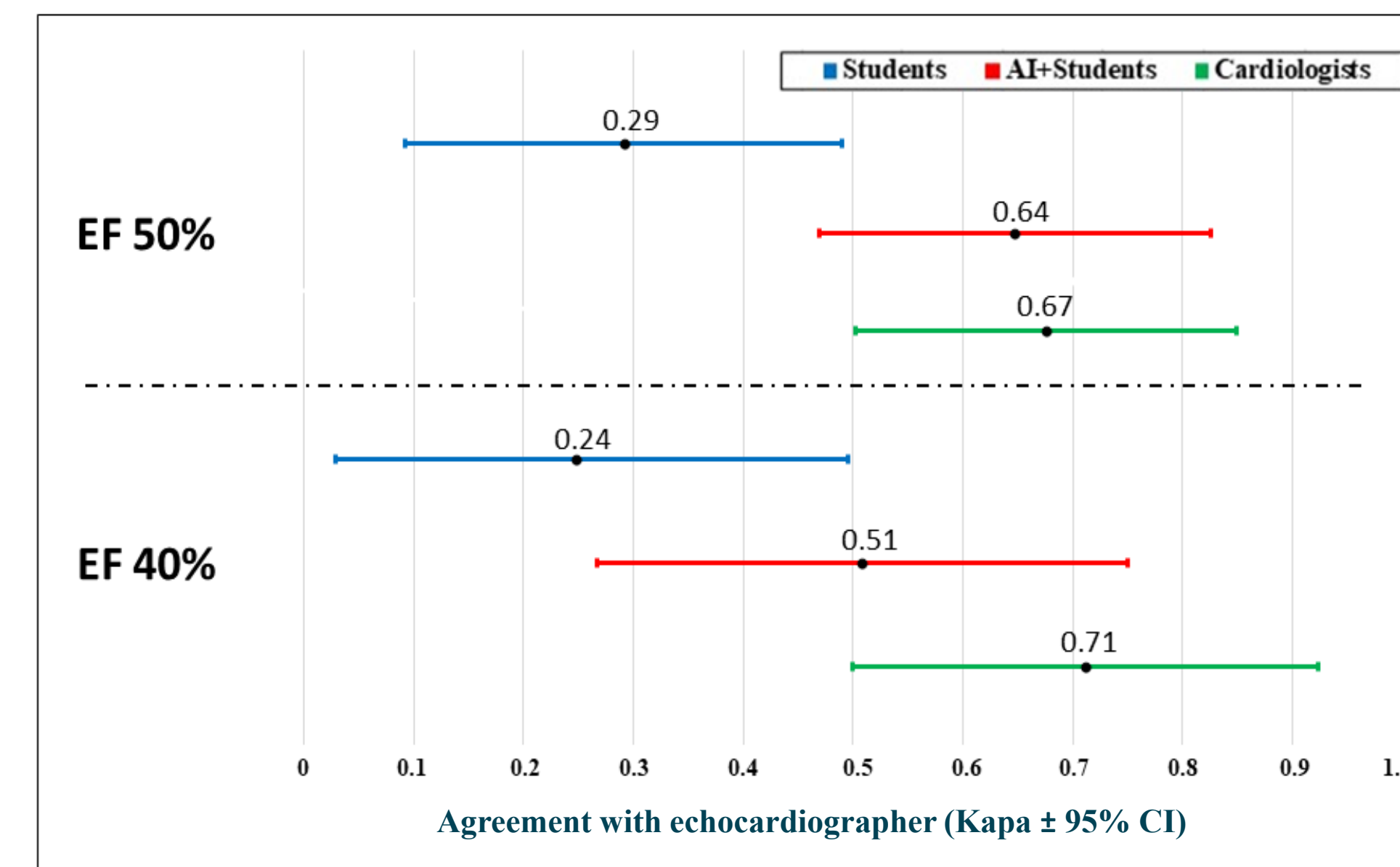
FIGURE 2-3. CORRELATION AND BLAND-ALTMAN ANALYSIS OF LVEF ASSESSMENT ON STUDENTS' ACQUIRED CLIPS BETWEEN STUDENTS' VISUAL EVALUATION AND THE AI MEASUREMENT VS. THE EXPERIENCED CARDIOLOGISTS



RESULTS

The study included 88 pts. (aged 58.3 ± 16.3 yrs.). The AI tool measurement was unsuccessful in 6 pts. Comparing LVEF (cont. values) reported by medical students' visual evaluation and students + AI vs cardiologists revealed a correlation of 0.51 and 0.83, respectively (Fig 2). Comparing these three evaluation methods with the experts, revealed a moderate/substantial agreement for the students + AI and cardiologists whereas only a fair agreement for the students' visual evaluation (Fig 4).

FIGURE 4. CATEGORICAL AGREEMENT OF LVEF ASSESSMENT COMPARING THE 3 ASSESSMENT METHODS OF STUDENTS' ACQUIRED ECHOCARDIOGRAM CLIPS (STUDENTS, AI + STUDENTS, AND CARDIOLOGISTS) WITH THE FELLOWSHIP TRAINED ECHOCARDIOGRAPHERS



CONCLUSIONS

Medical student use of an AI tool with a hand-held ultrasound device can improve their LVEF visual assessment to a level of experienced cardiologists. Also, the use of AI enabled achieving a moderate to substantial inter-rater reliability with expert evaluation. This AI tool can be successfully utilized as a decision support tool for POCUS LVEF evaluation by non-experts.