**Reviewer's report**

**Title:** Impact of a Training Program Incorporating Cardiac Magnetic Resonance Imaging on the Accuracy and Reproducibility of Two-dimensional Echocardiographic Measurements of Left Ventricular Volumes and Ejection Fraction

**Version:** 0  **Date:** 19 Sep 2019

**Reviewer:** Alessia Pepe

**Reviewer's report:**

This interesting paper, aimed to evaluate the efficacy of a novel training intervention based on CMR as a reference in improving inter-observer and inter-institutional variability of left ventricular (LV) volumes and LV ejection fraction (EF) measurements by two-dimensional echocardiography (2DE). The authors concluded that the training program, conducted by 54 sonographers from 5 hospitals, was useful in improving the accuracy of measuring LV volumes and LVEF in most of participants. Since it was observed that the degree of improvements differed among hospitals, authors proposed that an individualization of training programs may be required. I suggest the following major and minor revisions.

**MAJOR ISSUES**

Page 9 line 29 Results: Please, delete any comment from the "Results" section and move it to the "Discussion" (i.e. "As expected…").

Page 9 line 34-37 Results: About the paragraph "As expected, LV volumes measured by 2DE were significantly underestimated and LVEF was significantly overestimated compared to the corresponding values of CMR measurements in each hospital and for the whole cohort. However, the degree of this discordance differed substantially among hospitals.". Are differences in measurement accuracy among hospitals statistically significant? Please, report the P value.

Page 11 lines 41-44 Results: Please, add in text the p value of the comparison about the prevalence of expert sonographers among the hospitals.

Page 15 lines 7-41 Discussion: I suggest citing more briefly the studies by Daubert et al. and Thavendiranathan et al., without specifying data and results in deep details.

Table 4: Most of CV and CP values in Table 4 are different from the corresponding values in Table 3. Please, align tables.
MINOR ISSUES

Page 11 lines 36-41 Results: The following sentence "If we defined an expert sonographer as > 10 years' experience for echocardiography and a novice sonographer as ≤ 10 years' experience." is not a result; please, move it to "Methods" section.

Page 11 lines 51-54 Results: The following sentence "If we defined an active sonographer as the sonographer performing echocardiography examinations > 1000 cases/year" is not a result; please, move it to "Methods" section.

Page 11 lines 54-56 Results: The information about the percentage of active sonographers that ranged from 0 to 100 is also in Table 1. Please, do not repeat in text the results that are cited in Tables.

Page 12 lines 56-59 Discussion: Please, restate the sentence "Owing to its high spatial resolution, CMR SSFP images provide clearer visualization of the LV endocardial border, and the LV volumes and LVEF measured by CMR are associated with reduced inter-observer variability" as follows "Owing to its high spatial resolution and tissue contrast, CMR SSFP images provide clearer visualization of the LV endocardial border, and the LV volumes and LVEF measured by CMR are associated with reduced inter-observer variability".

Page 13 line 1 Discussion: I suggest citing more recent papers about the low inter-center variability of LV volumes and LVEF measurements by CMR (i.e. Marsella M. et al., Haematologica, 2011 and Aquaro G. et al JMRI, 2017) using the current sequences. The technique reported by Semelka RC in 1990 is obsolete: please, delete it.

Page 13 lines 12-15 Discussion: I suggest citing recent papers (i.e. Aquaro G. et al JMRI, 2017) about reference values of LV volumes by CMR.

Page 17 line 2: Please, delete the following sentence "Contrast echocardiography could replace CMR". There are no evidence supporting the sentence.

Table 3: I suggest specifying in table legend that p values are referred to the comparison between 2DE measurements in each hospital and CMR values.

Table 3: In Protocol 2 section, EF values in Site E and in Site A (41+-16) are like the global EF value (All sites), but there is not the symbol of p value <0.05. Maybe there is a typing error.
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