Agreement between spirometers : a challenge in the follow-up of patients and populations?

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Long-term cohort studies and lung function laboratories are confronted with the need for replacement of spirometers. Lack of agreement between spirometers might affect the longitudinal comparison of data, notably when replacing conventional by portable spirometers.; To compare the handheld EasyOne (EO) with the conventional SensorMedics (SM) spirometer, and to analyze the interdevice reproducibility of EO spirometers.; In total, 82 volunteers completed spirometry sessions with 1 SM and 2 of 3 EO spirometers following a Latin square design. Analyses of differences in forced vital capacity (FVC), forced expiratory flow in 1 s (FEV1), FEV1/FVC and mean forced expiratory flow calculated between 25 and 75% of the FVC between spirometers used a mixed effect model with a random intercept for each subject and the effect of the device as fixed effect adjusted for sex, age, height and order of spirometer tested. Bland-Altman plots show the 95% limits of agreement.; Comparisons between EO and SM showed relatively small mean differences of >3%, but systematically lower values for FVC and FEV1 in all EO devices. The 95% agreement exceeded the limits for FEV1 by 50 ml in 2 EO spirometers. The EO interdevice comparisons showed mean differences and limits of agreement within established thresholds, thus indicating fair accuracy when comparing devices. Repeats with the same spirometer did not result in statistically significant differences.; This study suggests fair agreement between the handheld and the conventional spirometer. Differences slightly exceeding limits for FEV1 in 2 EO devices might be considered mostly irrelevant for clinical practice. However, the systematically lower FVC and FEV1 observed with EO may be significant for epidemiological studies, thus justifying inspection before replacing devices.
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