Cross-comparisons of trending accuracies of continuous cardiac-output measurements: pulse contour analysis, bioreactance, and pulmonary-artery catheter

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We compared the similarity of cardiac-output (CO) estimates between available bolus thermodilution pulmonary-artery catheters (PAC), arterial pulse-contour analysis (LiDCOplus™, FloTrac™ and PiCCOplus™), and bioreactance (NICOM™). Repetitive simultaneous estimates of CO obtained from the above devices were compared in 21 cardiac-surgery patients during the first 2 h post-surgery. Mean and absolute values for CO across the devices were compared by ANOVA, Bland-Altman, Pearson moment, and linear-regression analyses. Twenty-one simultaneous CO measurements were made before and after therapeutic interventions. Mean PAC CO (5.7 ± 1.5 L min) was similar to LiDCO™, FloTrac™, PiCCO™, and NICOM™ CO (6.0 ± 1.9, 5.9 ± 1.0, 5.7 ± 1.8, 5.3 ± 1.0 L min, respectively). Mean CO bias between each paired method was -0.10 (PAC-LiDCO), 0.18 (PAC-PiCCO), -0.40 (PAC-FloTrac), -0.71 (PAC-NICOM), 0.28 (LiDCO-PiCCO), 0.39 (LiDCO-FloTrac), -0.97 (NICOM-LiDCO), 0.61 (PiCCO-FloTrac), -1.0 (NICOM-FloTrac), -0.73 (NICOM-PiCCO) L/min, with limits of agreement (1.96 SD, ±95% CI) of ± 2.01, ±2.35, ±2.27, ±2.70, ±1.97, ±2.17, ±3.51, ±2.87, ±2.40, and ± 3.14 L min, respectively, and the percentage error for each of the paired devices was 35, 41, 40, 47, 33, 36, 59, 50, 42, and 55%, respectively. From Pearson moment analysis, dynamic changes in CO, estimated by each device, showed good cross-correlations. Although all devices studied recorded similar mean CO values, which dynamically changed in similar directions, they have markedly different bias and precision values relative to each other. Thus, results from prior studies that have used one device to estimate CO cannot be used to validate others devices.