

NURSE-DERIVED CARDIAC OUTPUT MEASUREMENT USING A NON-INVASIVE CARDIAC OUTPUT MONITOR

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Introduction :

The USCOM (Ultrasonic Cardiac Output Monitor) device is a non-invasive monitor which utilises continuous wave doppler to determine cardiac output (CO). The aims of our study were to compare CO using USCOM with CO using Pulmonary Artery Catheter (PAC) and assess the learning curve when performed by a non-echocardiographically trained ICU nurse.

Method:

Ten patients, aged 24-65 years, who were spontaneously breathing and required PAC as part of evaluation for heart failure were studied. Demographic and clinical data were recorded. In a blinded fashion, we simultaneously compared CO obtained by USCOM with thermodilution measurements obtained by PAC and estimated from a modified Fick equation. A generalised estimating equation was used to assess correlation between methods due to multiple recordings per patient. Bland and Altman method was used to assess agreement.

Results:

The CO measured by PAC ranged from 2.6 to 7.1 l/min for thermodilution and from 3.1 to 8.7 l/min by Fick. USCOM derived CO was highly correlated with both thermodilution and Fick methods. The mean difference was -0.35 l/min (CI -0.74-0.04) with limits of agreement from -1.9 to 1.2. From commencement of the study to conclusion, time to optimal image acquisition reduced from 25 minutes to 5 minutes despite the technically difficult study population.

Conclusion:

USCOM has been found to be reliable and accurate in measuring CO. The learning curve for successful usage of USCOM by an ICU nurse is satisfactorily short which suggests USCOM could be used by appropriately trained nursing staff to non-invasively determine CO. Further work is required in ventilated patients.