

Efficacy of a Transthoracic Doppler System to Access Cardiac Function on Ventilated Patients in the Intensive Care Unit.

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Background: With increasing questions about the value of Invasive Cardiac Monitoring and with current concerns about the adverse effects of Pulmonary Artery catheters, non-invasive assessment of cardiac function appears to be an attractive alternate. However ventilator associated respiratory artifacts may not allow reliable assessment of cardiac function by transthoracic sonographic methods in the patient in the intensive care unit.

Aims and Method: We tested a commercially available Doppler System (USCOM Pty Ltd., Australia) with transthoracic Doppler probes that can be fixed to a patient's chest wall by unique anchoring device that preserves the acoustic window. As the performance of the system has already been validated against thermo-dilution CO measurements, our goal was to determine if good acoustic windows can be obtained in Medical – Surgical patients on mechanical ventilation. We hypothesized that the patient variables age, gender, Body mass index (BMI), and the existence of cardiopulmonary pathology would influence the quality of acquired images.

Results: The Doppler images were obtained on 24 ventilated patients (19 men & 5 women) with a mean age of 52 years (range 22-80 years). Adequate acoustic window could be obtained on 21 patients (88%) using either a 2.2 MHz probe or 3.3 MHz probe. Fifteen of these 21 patients had images that were rated by the user as being adequate or excellent. The median time taken to acquire the first image was 5 minutes, but increased to 7 min in images rated as poor. The quality of the image was not influenced by the age of the patient. The individuals in whom no Doppler image could be obtained were all male (3/3). 2 of these 3 patients (66%) had significant cardiopulmonary pathology (versus 29% in patients in whom imaging was adequate). These patients were also thinner (Mean BMI 19 Vs 22 Kg/sq M) than individuals in whom adequate windows were obtained.

Conclusion: The transthoracic Doppler is an adequate mode of obtaining hemodynamic assessments in most mechanically ventilated patients in the intensive care unit. An adequate window is difficult to obtain in thin males with underlying cardiopulmonary disease.