

OBSERVER AGREEMENT OF NON-INVASIVE CARDIAC OUTPUT MEASUREMENT IN THE EMERGENCY DEPARTMENT USING PORTABLE CONTINUOUS WAVE DOPPLER DEVICE (USCOM).

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Introduction : Early recognition and treatment of shock has been shown to improve patient outcome and survival dramatically. Physical examination and conventional vital signs are known to be inaccurate. Central haemodynamic indices (e.g. cardiac output) are much more sensitive in this respect. Pulmonary catheterization and thermodilution is impractical in the emergency department (ED). By the time patient reaches the intensive care unit (ICU), the 'golden hour' to treat shock with the best possible outcome has passed. Non-invasive cardiac output measurement using portable Ultrasonic Cardiac Output Monitor (USCOM) is the solution to the above dilemma. However, the technique of using USCOM is still operator-dependent. This study aimed to determine the level of inter-operator agreement in using USCOM to measure cardiac output in the ED.

Methods : Three operators received standardised training on using USCOM. They then measured the cardiac output of the same 119 subjects independently and blinded to each other's measurements during the process. Subjects were recruited from patients in the emergency department or observation ward or healthy volunteers aged 18 years and over, with no pre-existing aortic valve disease, prosthetic aortic valve or atrial fibrillation. Inter-operator agreement was measured by the intraclass correlation coefficient (ICC) under the two-way random effects ANOVA model, and by plotting the difference between each pair of operators' readings against the corresponding mean for each subject.

Results : The intraclass correlation co-efficient was 0.859 (95%CI 0.813 to 0.896), indicating an excellent overall inter-operator agreement corrected for agreement-by-chance. Bland-Altman analysis showed that the mean difference between each pair of operators' USCOM cardiac output measurement on the same 119 patients were -0.23 L/min (95%CI: -0.38 to -0.06), 0.09 L/min (95%CI: -0.10 to 0.28) and 0.31 L/min (95%CI: 0.15 to 0.47), which were very small and therefore unlikely to result in differences in clinical decision-making.

Conclusions: USCOM has a high level of inter-operator agreement despite its operator-dependent nature, and would be of great value to the ED physician for the early recognition of shock and for monitoring response to resuscitation.