

PROGNOSTIC VALUE OF NON-INVASIVE CARDIAC INDEX MEASUREMENT IN THE EMERGENCY DEPARTMENT USING PORTABLE CONTINUOUS WAVE DOPPLER DEVICE (USCOM): A PILOT STUDY.

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Introduction : Ultrasonic Cardiac Output Monitor (USCOM) represents a major advance in patient assessment in the emergency department (ED). It enables the emergency physician to gain essential information on the central haemodynamics of patients requiring resuscitation. Clinical applications of USCOM include early shock recognition, differential diagnosis of shock, monitoring therapy, goal-directed resuscitation and transcutaneous pacing. However, little is known about USCOM's prognostic value. This is a pilot study to obtain parameter estimates and to test the logistics for planning a larger study to determine whether a low cardiac index (CI) during the initial resuscitation stage in the ED (as measured non-invasively using USCOM) is associated with a poorer outcome during the course of hospitalization.

Methods : Trained operators used USCOM to measure the initial CI of patients with cardiovascular emergencies requiring resuscitation in the ED. The CIs of patients with specific adverse events were compared to those without the adverse events. Pre-defined cut-off values of CI were tested for sensitivity, specificity and predictive values for the adverse events. The overall performance of non-invasive cardiac output measurement using CW Doppler (USCOM) for detecting specific adverse events would be evaluated using the Receiver Operating Characteristic (ROC) curve. The magnitude of difference between the mean CI of patients with adverse events and those without the adverse events would be used to calculate the required sample size for conducting a larger study with 80% power and a significance level of 0.05.

Results : Of the 40 resuscitation patients with cardiovascular emergencies, 16 had one or more of four adverse events [ADV] (death, ICU admission, requirement of inotropic support, intubation and/or ventilation). The mean CI of the patients with ADV was significantly lower than that of patients without ADV (1.75 vs 2.12 L/min/m² Mann-Whitney U test). The required sample size for conducting a full-scale study with 80% power and a significance level of 0.05 was calculated to be 188. Using a CI of 2 L/min/m² as cut-off, the sensitivity and specificity for detecting ADV were 75.0% and 45.8% respectively. The area under the ROC curve for CI to predict one or more ADV was 0.70 (95%CI:0.52 – 0.88).

Conclusions: The results of this pilot study indicated that cardiovascular emergency patients who did worse during hospitalization had a significantly lower initial CI than those who did better. A larger study with the calculated sample size is therefore justified.