

THE IMPEDANCE CARDIOGRAM IS AN INDICATOR OF CPR EFFECTIVENESS FOR OUT-OF-HOSPITAL CARDIAC ARREST VICTIMS

i2 Poster Contributions

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Background: The ERC guidelines place a greater emphasis on the importance of external cardiac massage and advocate the prompt initiation of effective bystander CPR to significantly reduce mortality due to out-of-hospital CA. An algorithm has been developed which utilizes distinctive features in the impedance cardiogram (ICG) to ensure effective chest compressions are administered by the operator.

Methods: At the time of cardiac arrest the HeartSine AED was applied using AED electrodes adhered to the chest wall to the right of the upper sternum and over the cardiac apex. The ECG, ICG and any CPR were recorded electronically for downloading later using the data recovery unit. Thresholds were pre-determined following retrospective analysis of 170 cases of CPR. The amplitude of the ICG signal, if outside the minimum threshold, was classified as CPR. Sensitivity and specificity scores were calculated as shown below in table 1.

Results:

CPR Criteria	ICG Test Sample Size	Performance Specifications (%)	Performance Results (%)	90% One-Sided Lower Confidence Limit (%)
(ICG_SPEED) Adequate	82377	Sensitivity: > 90 Specificity: > 90	Sensitivity: 95.38 Specificity: 93.11	Sensitivity: 83.40 Specificity: 82.19
(ICG_FORCE) Adequate	108728		Sensitivity: 99.96 Specificity: 98.47	Sensitivity: 99.54 Specificity: 96.29

Table 1 - Sensitivity and Specificity results based on both speed and force of CPR

Conclusion: Both the ICG_FORCE and ICG_SPEED CPR management tools will enhance CPR efficacy for both lay users and minimally trained bystanders by continuously advising on the quality of the compressions administered. The administration of effective chest compressions can significantly reduce the chances of neurological impairment due to inadequate cerebral oxygenation following a CA. The above results merit further investigation using ICG to develop an algorithm to detect the presence of a pulse.