Method of predicting or prognosticating neurological performance and survival in patients who have suffered a cardiac arrest due to ventricular fibrillation (VF)

Both in-hospital and out-of-hospital cardiac arrests due to VF are associated with high mortality rates and significant cerebral disability. This method enables an early reliable prognostication in comatose survivors, especially those undergoing mild hypothermia.

Description and special features

Method with high sensitivity, specificity and c-Statistic values for the early prediction -based on a validated and reliable risk-score (RS)- of neurological performance (FNP) and survival (S) in patients undergoing therapeutic hypothermia after cardiac arrest due to ventricular fibrillation (VF) and comatose status on admission.

The method consists of a multiple logistic regression with four predictors and combines: i) information of ventricular fibrillation (VF) spectral characteristics registered at the time of the first reported Direct Current Shock (DCShock), and ii) ambulatory patient-specific clinical information to provide a reliable RS of the expected outcome, cerebral performance and survival, at hospital discharge.

The key scientific findings that confer an innovative practical approach to this invention are that the research team 1) have shown the cut-off value of the Dominant Frequency (DF) before the first DCShock, as a strong independent predictor for favorable neurological performance (FNP); 2) have derived two further significant spectral variables crucial for predicting not only neurological performance but also survival: the high-to-low power spectral density ratio (HL-PSDR), and the high-to-low peak ratio (HL-pKR), (3) have also discovered that the number of shocks delivered before ROSC ("Return of spontaneous circulation") is also important for the early prognosis of neurological performance.

Competitive advantages

Up to date, the reliability of early prognosis in comatose survivors undergoing therapeutic hypothermia after cardiac arrest due to VF has been very limited, which has severely impaired the ability of physicians to provide accurate information to patients' relatives and to optimize the use of intensive-resource care.

Standardization of mild hypothermia delays neurological evaluation and prognostication due to sedation as well as higher rates of misleading biomarker values within the first 24-48 h. Moreover, the large variability of threshold biomarker values used to predict poor outcome and different measurement techniques makes it necessary to exert caution and question the prognostic accuracy provided by biochemical markers. And on the other hand, clinical variables alone are inconsistent in predicting both cerebral performance and survival.

The prediction model proposed herein enables an early reliable prognostication of survival and/or neurological performance after hospital discharge and/or for at least 6 months after suffering cardiac arrest, in patients which have suffered a cardiac arrest, and optionally comatose status, due to VF.

Type of collaboration sought

Cooperation is sought with any Party interested in partnering, licensing or investing in the technology, whether it be an investor to finance the project, a partner interested in getting involved in any of the different phases until the placing on the market, a patent licensee, etc. Organisations potentially interested in this product are those devoted to the manufacture, commercialization and/or distribution of healthcare products; as well as hospitals, healthcare centres, etc.

Current stage of development

Two different studies have been carried out in order to validate the method. Both of them were performed in a referral center for out-of-hospital cardiac arrest (Hospital Universitario La Paz, Madrid, Spain), with eligible patients from September 2006 to September 2011 (and retrospective data analysis), and from October 2011 to July 2013.

Current state of intellectual property

European patent EP14382456.3, applied for in November 2014.

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