C-GRApH: A Validated Scoring System For The Early Risk Stratification Of Neurologic Outcomes After Out-of-hospital Cardiac Arrest Treated With Therapeutic Hypothermia

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Background: Out of hospital cardiac arrest (OHCA) has 90% mortality, primarily from neurologic injury. Due to a lack of accurate early risk stratification models, guidelines advocate delayed prognostication of neurologic outcomes (NO) ≥72 hours post OHCA in patients treated with therapeutic hypothermia (TH). Here, we derive and validate a scoring system that uses objective data available at hospital presentation to risk stratify NO early post OHCA in the TH era.

Methods: Demographics, pre OHCA diagnoses, arrest characteristics, and initial lab studies were compared between favorable and poor NO at hospital discharge, defined as cerebral performance category (CPC) 1-2 and 3-5 respectively, in a derivation cohort of 122 consecutive adult patients treated with TH (32-34 oC) post OHCA at a tertiary care US hospital from 2008-12. Inputs meeting a priori cutoffs ρ<0.1 in univariate and ρ<0.05 in subsequent stepwise multivariable analyses were dichotomized to create a scoring system (C-GRApH) with equal weighting. C-GRApH was validated internally from 2013-4 (n=72) and externally at a larger health system (quaternary care and satellite hospitals) from 2012-4 (n=272).

Results: In the derivation and validation cohorts, 34 and 32% of patients survived to discharge, 27 and 21% with favorable NO respectively. The C-GRApH score (range 0-5) includes the following variables: pre-OHCA CAD (C); initial glucose >200 (G); non VT/VF rhythm of arrest (R); age >45 (A); and initial pH ≤7.0 (pH). The c-statistic was 0.82 for predicting poor NO in both cohorts with similar risk stratification observed. Favorable NO at hospital discharge was 70% in low (≤1, n=60), 20% in medium (2-3, n=307), and 2% in high (≥4, n=97) scores in the composite cohort.

Conclusions: The C-GRApH score effectively stratifies NO in OHCA treated with TH early post-arrest using data readily available at initial presentation and identifies a subset of patients (scores≥4) where TH and intensive care are of limited benefit.