**Carbon Dioxide, Blood Pressure, and Perioperative Stroke: a Retrospective Case-Control Study**

**Supplemental Digital Content 4:** Interaction Testing – Wald Test

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| --- | --- | --- | --- | --- |
| **Threshold** | **Cross-Level Estimate** | **Standard Error** | **Wald** | **Wald p-value** |
| AUC MAP<55 mm Hg | 0.049 | 0.490 | 0.100 | 0.540 |
| AUC EtCO2≤30 mm Hg |  |  |  |  |
| AUC MAP<60 mm Hg | 0.021 | 0.157 | 0.136 | 0.554 |
| AUC EtCO2≤30 mm Hg |  |  |  |  |
| AUC MAP<65 mm Hg | 0.012 | 0.104 | 0.100 | 0.544 |
| AUC EtCO2≤30 mm Hg |  |  |  |  |
| AUC MAP<55 mm Hg | 0.081 | 0.811 | 0.100 | 0.540 |
| AUC EtCO2≤35 mm Hg |  |  |  |  |
| AUC MAP<60 mm Hg | 0.038 | 0.374 | 0.102 | 0.541 |
| AUC EtCO2≤35 mm Hg |  |  |  |  |
| AUC MAP<65 mm Hg | 0.022 | 0.156 | 0.143 | 0.557 |
| AUC EtCO2≤35 mm Hg |  |  |  |  |
| AUC MAP<55 mm Hg | 0.042 | 0.516 | 0.113 | 0.545 |
| AUC EtCO2≥45 mm Hg |  |  |  |  |
| AUC\_MAP<60 mm Hg | 0.019 | 0.165 | 0.113 | 0.545 |
| AUC EtCO2≥45 mm Hg |  |  |  |  |
| AUC MAP<65 mm Hg | 0.010 | 0.110 | 0.090 | 0.536 |
| AUC EtCO2≥45 mm Hg |  |  |  |  |

AUC, total area under the curve; MAP, mean arterial pressure; EtCO2, end-tidal carbon dioxide

Predictions and marginal effects can be compared across models using seemingly unrelated estimation to combine estimates from multiple models. Specifically, the Wald test can be used to test predictions and effects across models, including interactions. For estimating covariance across models, estimate covariance matrices of multiple models can be stacked together, which creates both within- and cross-model variances and covariances of regression coefficients. Predictions and marginal effects can then be estimated along with the necessary variances and covariances for testing the equality of estimates across models. Following the estimation of the covariance matrix two seemingly unrelated regression models can be used – one using the predictors whose interaction is of interest (e.g., mean arterial pressure, end-tidal CO2), and a second model with only one predictor (e.g., mean arterial pressure). If there is interaction between the two predictors, the test of equality of the coefficients in these two models will be rejected.

**Supplemental Reference**

Mize TD, Doan L, and Long JS. A general framework for comparing predictions and marginal effects across models. *Sociological Methodology* 2019; 49:152-89