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COMPARISON OF REGRESSION AND NEURAL NETWORK MODELING FOR PREDICTING POSTOPERATIVE ADVERSE EVENTS. SA Gaehde, N Markuzon, AS Ash, GA Carpenter, MA Moskowitz, Section of General Internal Medicine, Boston University Medical Center, Department of Cognitive and Neural Systems, Boston University, Boston, MA

Developing clinical models to predict adverse events and mortality following major clinical interventions may be an important part of a quality assessment program. Neural Networks (NN) offer certain advantages when compared to logistic regression modeling including robust prediction for real-time on-line monitoring. We have modified ARTMAP, a self-organizing pattern classification NN, to provide probabilistic estimates of risk. We compare regression and ARTMAP techniques for predicting the occurrence of an adverse event in a group of 3182 Medicare beneficiaries from 7 states undergoing cholecystectomy. Sixteen types of severe adverse events (including 30 day mortality) following surgery were clinically defined outcomes. Chart abstracted preoperative patient characteristics were obtained using the Medisgroups protocol. Cross validation was performed by randomly dividing the data into 5 equal parts and successively applying models to fit the remaining four fifths. At least one adverse event occurred in 16.4% of patient's. AE rates in the lowest vs. highest decile of ARTMAP defined risk were 6% vs. 40% compared to 6% vs. 41% for regression. Summary measures of model performance were similar (r2 = 0.062 vs. 0.065, both C-statistics = 0.68. Hosmer-Lemeshow statistics revealed better fit of the regression models (X^2_8 = 13.6 vs. 48.4). ARTMAP may be a promising alternative to regression techniques for building models to predict severe postoperative events.

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