

## **Neural Network Classifier for Automatic Detection of Invasive Versus Noninvasive Airway Management Technique Based on Respiratory Monitoring Parameters in a Pediatric Anesthesia**

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**Introduction:** Children undergoing general anesthesia require airway monitoring by an anesthesia provider. The airway may be supported with noninvasive devices such as face mask or invasive devices such as a laryngeal mask airway or an endotracheal tube.

**Methods:** We retrieved three sets of consecutive patients that received general anesthesia in 2015 with either mask, laryngeal mask airway or endotracheal tube from a clinical data warehouse. Patients were limited to the following procedure groups: myringotomy, tonsillectomy, adenoidectomy or inguinal hernia repair. We retrieved measurements for end-tidal carbon dioxide, tidal volume and peak inspiratory pressure. We calculated statistical features for each data element per patient and applied machine learning algorithms (decision tree, support vector machine and neural network) to classify patients into two categories: noninvasive or invasive airway device support.

**Results:** We identified 300 patients per group (mask, laryngeal mask airway, and endotracheal tube) for a total of 900 patients from the clinical data warehouse. The neural network classifier performed better than the boosted trees and support vector machine classifiers based on the test data sets. The sensitivity, specificity, and accuracy for neural network classification are 97.5%, 96.3%, and 95.8%. In contrast, the sensitivity, specificity and accuracy of support vector machine are 89.1%, 92.3%, and 88.3% and with the boosted tree classifier they are 93.8%, 92.1%, and 91.4%.

**Discussion:** We describe a new method to automatically distinguish between noninvasive and invasive airway device support used in a pediatric surgical setting based on respiratory monitoring parameters. The results show that the neural network classifier algorithm can accurately distinguish between noninvasive and invasive airway device support.