**Detection of Respiratory Compromise by Acoustic Monitoring, Capnography, and Brain Function Monitoring during Monitored Anesthesia Care**
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Episodes of apnea in sedated patients represent a risk of respiratory compromise. We hypothesized that acoustic monitoring would be equivalent to capnography for detection of respiratory pauses, with fewer false alarms. In addition, we hypothesized that the patient state index (PSI) would be correlated with the frequency of respiratory pauses and therefore could provide information about the risk of apnea during sedation.

Patients undergoing sedation for surgical procedures were monitored for respiration rate using acoustic monitoring and capnography and for depth of sedation using the PSI. A clinician blinded to the acoustic and sedation monitor observed the capnograph and patient to assess sedation and episodes of apnea. Another clinician retrospectively reviewed the capnography and acoustic waveform and sound files to identify true positive and false positive respiratory pauses by each method (reference method). Sensitivity, specificity, and likelihood ratio for detection of respiratory pause was calculated for acoustic monitoring and capnography. The correlation of PSI with respiratory pause events was determined.

For the 51 respiratory pauses validated by retrospective analysis, the sensitivity, specificity, and likelihood ratio positive for detection were 16, 96 %, and 3.5 for clinician observation; 88, 7 %, and 1.0 for capnography; and 55, 87 %, and 4.1 for acoustic monitoring. There was no correlation between PSI and respiratory pause events.

Acoustic monitoring had the highest likelihood ratio positive for detection of respiratory pause events compared with capnography and clinician observation and, therefore, may provide the best method for respiration rate monitoring during these procedures