Improving Pulse Oximetry Pitch Perception with Multisensory Perceptual Training

Presenting Author: Joseph J. Schlesinger, MD, Vanderbilt University Medical Center

Co-Authors: Ryan Stevenson, PhD, Vanderbilt University Medical Center; Mark Wallace, PhD, Vanderbilt University Medical Center

Background/Introduction: The pulse oximeter is a critical monitor in anesthesia practice that is thought to have improved patient safety. However, attention to the monitor is compromised by noise and other competing factors. Most negative patient outcomes in anesthesia result from a series of small errors, and as such, improving anesthesiologists’ performance with pulse oximetry may translate into improved patient outcomes. Here, we aimed to improve the ability of anesthesiologists to monitor arterial oxygen saturation via pulse oximetry through a multisensory (i.e., audiovisual) training process.

Methods: Fifteen residents’ abilities to detect auditory changes in pulse oximetry were measured before and after a multisensory perceptual-training paradigm, which incorporates the ability to judge whether audio and visual stimuli are presented synchronously or asynchronously. Accuracy and response times in detecting changes on the monitor were measured under three levels of attentional load and with and without operating room background noise. The only post-training assessment occurred less than 48 hours after training.

Results: In the condition most similar to operating room (noisy and attentionally demanding), anesthesiology residents showed an average 9% increase in accuracy of pulse oximetry pitch change detection and 11% decrease in response times following training. Fourteen of fifteen residents improved in their multisensory perceptual ability after training.

Conclusion: Multisensory training represents a novel means to improve the performance of detecting changes in the pulse oximeter. Increasing the performance of anesthesiologists has the ability to greatly improve patient monitoring and outcomes by preventing small errors; errors that have the potential to cascade into adverse outcomes. Our work builds a foundation for examining patient outcomes as related to anesthesia education and training.