

# Part-task trainer evaluation of a head-mounted display for physically constrained anesthesiologists

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**Aims.** We evaluated a head-mounted display (HMD) of vital signs using a part-task trainer to determine whether it affects the speed with which anesthesiologists can detect clinical changes when performing physically constraining tasks.

**Background.** Anesthesiologists wearing an HMD can monitor the patient's clinical signs and perform tasks while keeping the vital signs parameters within view at all times. Evaluations in simulators by anesthesiologists [1] and surgeons [2] indicate that critical events can be detected faster with an HMD than with the standard monitoring alone. However, evaluations of monitoring with HMDs under less constrained, naturalistic operating room conditions reported no difference in event detections [3,4].

**Methods.** Twelve anesthesiologists (Royal Adelaide Hospital) navigated a maze on a Dexter® Endoscopic Dexterity Trainer using a fiber-optic bronchoscope in two 8-12 minute scenarios. The anesthesiologists concurrently monitored a simulated patient's vital signs using a monitor located directly behind them (Control condition). In the HMD condition, the standard monitor was available plus the HMD which displayed HR, SpO<sub>2</sub>, NIBP, ETCO<sub>2</sub> and the CO<sub>2</sub> waveform.

Four events were embedded within each scenario and consisted of numerical changes (light anesthesia, hypovolemia), waveform changes (excess sedation), or a waveform change with an auditory cue (ischemia). Detection times were tested for significance using ANOVAs and Planned Comparisons with  $\alpha=0.05$ .

**Results.** Two events were detected faster with the HMD: light anesthesia (16.8 vs 29.7 secs,  $p=0.034$ ) and hypovolemia (13.9 vs 36.3 secs,  $p=0.019$ ). However, the excess sedation event was detected more slowly with the HMD (77.9 vs 25.7 secs,  $p<0.001$ ). There was no significant difference in detection times for the ischemia event (69.3 vs 80.3 secs).

**Conclusions.** The results indicate that HMDs can help anesthesiologists detect critical events faster when they are busy and physically constrained. The slower detection of the excess sedation event with the HMD suggests that anesthesiologists may miss changes to waveforms displayed on the HMD. Further research into the design and presentation of vital signs information on HMDs is warranted.

## References:

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