

Introduction

Heightened stress-responses may affect task performance during time-sensitive, cognitive and technically challenging tasks such as carotid artery injury management. The physiologic response of surgeons managing an acute internal carotid artery injury is not known.

Methods

Participants completed a cadaveric perfusion-based carotid artery injury control task in a high-fidelity mock operating room. Participants made a first attempt (“trial one”) at injury control without coaching and then received a brief educational intervention and coaching. A repeat attempt was then made (“trial two”). Success was defined as task completion within five minutes. Participants completed pre- and post-task questionnaires. Heart rate (HR) monitoring was performed using an Apple Watch (Watch OS 3.1, Apple, Cupertino, CA).

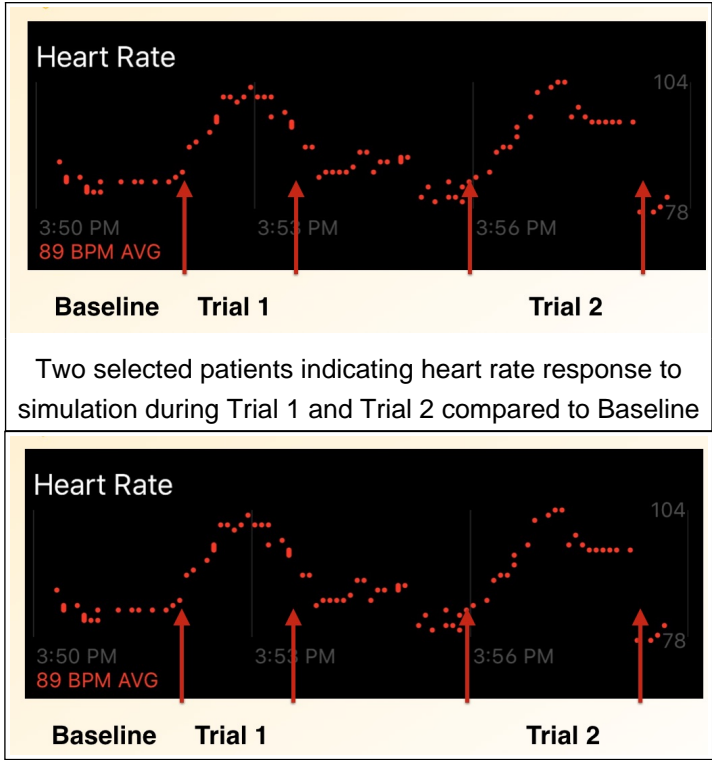


Results

Fifty-seven neurosurgery and otolaryngology attending and resident surgeons participated. The average HR at baseline was 88.3±14.3 (mean±SD) beats per minute (bpm). Compared to baseline, average and peak HR were significantly elevated during trial one and trial two (p<0.001), and lower in trial two than trial one (p<0.01). Tachycardia (HR=100) occurred in 66.1% of participants during the simulation. In univariate analysis, there were no associations between HR and surgeon factors, except for baseline aerobic exercise. Although HR was not associated with success on trial one, HR at baseline was associated with success on trial two (failures 76.6±11.0 bpm, successes 89.7±14.1 bpm, p=0.03). HR during trial two had a trend-level association with success (failures 83.3±13.6 bpm, successes 96.4±15.7 bpm, p=0.055). Even after controlling for aerobic exercise, surgeons with lower baseline HR had increased odds of trial two failure (OR 1.09, CI 1.01-1.22).

Conclusions

Surgeons of all levels of experience exhibited tachycardia indicative of a physiological stress response, supporting the validity of this ICA injury cadaveric simulation model. Increased HR response was not associated with adverse task performance. The paradoxical relationship of lower HR to task success underscores the complexity of the stress-performance relationship.



Learning Objectives

feasibility of physiologic monitoring, objective validation of simulation model, stress response to training