

Intraoperative Cognitive Load Differences between Trainees and Attending Surgeons

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Background/Objective: Cognitive load (CL) is the amount of mental effort and resources required to complete a task and process information in the working memory. In a surgical setting, high CL decreases attention to critical details, and slows down decision-making, increasing errors which can compromise patient safety. Our aim was to determine if CL differences exist between trainees and experienced attending surgeons. Such differences could inform readiness for trainee autonomy and training paradigms.

Methods: Eye trackers were used by attending general surgeons and trainees during robotic gastrointestinal procedures to determine their CL. Average fixation rate (AFR), fixation to saccade (F:S) ratio, and change in pupil size, were recorded and compared between attending surgeons and trainees to determine differences in intraoperative cognitive load.

Results: Three attendings and three trainees participated. While operating, trainees had a lower AFR (M=0.775, SD= 0.093) and a lower F:S (M=0.497, SD=0.102) compared to attendings (M=0.842, SD=0.152 and M=0.592, SD=0.243, respectively). Both trainees and attendings had a larger pupil size (M=4.29, SD=0.773 and M=3.63, SD=0.077, respectively) while operating compared to their pupil size while not operating (M=4.057, SD=0.821 and M=3.496, SD=0.059, respectively).

Conclusion and Potential Impact:

In this pilot study, we determined eye tracking metrics can be used to detect differences in intraoperative CL between trainees and attending surgeons and while they were operating or observing. Further research should determine methods that decrease CL of trainees.