Eye Tracking to Measure Cognitive Workload During EHR Use

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Background

- Cognitive workload focuses on the margin between the amount of cognitive effort required to complete a task and the resources (e.g., time) available for that task.
- Objective measures can be superior in situations where accurate subjective measurement is not viable.

Purpose

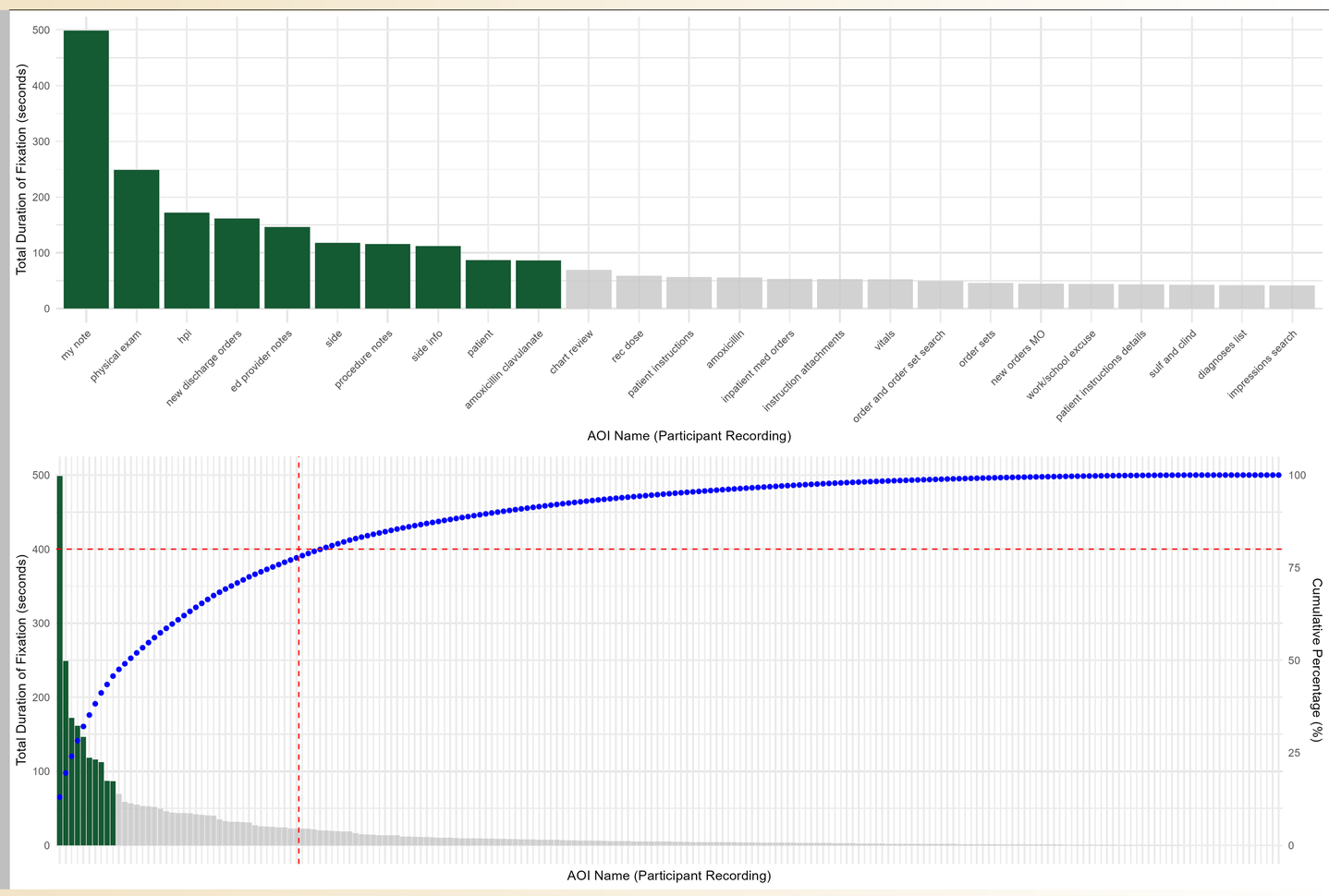
- This study aims to use eye tracking to measure cognitive workload objectively while using EHR. The findings from this study can inform interventions such as the use of artificial intelligence (AI) to improve the EHR interface.

Methods

- Emergency department providers (n=17) underwent 3 simulated tasks associated with prescribing antibiotics at discharge, using the equipment and EHR they typically used.
- Participant simulations lasted about 10 minutes.
- Eye tracking data was collected with the Tobii Fusion Eye Tracker. Data captures metrics on over 30 indicators for every participant including; gaze point coordinates, pupil diameters, validity, precision, and eye movement classification.
- To streamline data analysis for workload, areas of interest (AOIs) from the on-screen simulation were determined and used to analyze groups based upon on-screen location.

Results

- Eye-tracking data indicated 85 AOIs based on the duration of fixation.
- The top 10 AOIs (Figure) reflect clinician time spent on an activity. suggesting these are critical aspects of the EHR interface from a workload perspective.
- The top ~20% of the AOI held >80% of their attention. We also identified differences in total duration of fixation across scenarios and participants.



Discussion

- Eye tracking is a feasible way of measuring cognitive workload using EHR.
- AI applications could use AOI data to personalize EHR systems such as reducing the time and cognitive load associated with common tasks and providing suggestions on automated entry.
- AI applications could also automate routine documentation tasks noted by frequent fixations (e.g., entering standard medication orders or confirming patient information). Eye tracking data can help develop adaptive training tools for new clinicians where AI-driven simulations use these results to drive scenarios that mimic observed behavior.

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