Acquiring Insight Into the Cognitive Processes of Clinicians

To the Editor:

We applaud the work of Murray et al[1] on their important research on decision making in the simulated setting. Not surprisingly, this work has prompted even more questions regarding the complexity of the decision-making process in the acute care arena.[2] In their accompanying editorial, Stiegler and Gaba[2] challenge educators and researchers to continue to seek answers about how to best train clinicians to make complex decisions and implement appropriate strategies. In particular, they cite the challenges associated with current observational and retrospective strategies used in the simulated setting to make inferences about clinicians thought processes as they make decisions.

We would like to suggest that researchers consider the use of eye tracking as a means of acquiring insight into the cognitive processes of clinicians. Eye tracking is an approach for measuring and recording a clinician's eye movements as they perform a task (e.g., observing vital signs on a cardiac monitor). The premise underlying the use of eye tracking is that there is a relationship between where the clinician is looking and what they are attending to at that point in time. This "eye-mind" theory suggests that an individual's set of eye movements can provide insight into their cognitive processes.[3]

Because eye tracking data are objective and quantitative, it can be used to supplement observational data that may be more subjective and lead to inconsistencies among reviewers such as that described in the article by Murray et al.[1] Our team of interdisciplinary researchers at the University of Massachusetts in Amherst and Baystate Medical Center has used eye tracking to describe the behaviors of physicians, nurses, and other health care workers as they deliver routine care in a simulated setting.[4,5] We have also found eye tracking to be an effective debriefing method for improving clinician safety practices that involved skill and rule-based behaviors (e.g., comparing patient identifiers on the patient identification band with other artifacts).[6]

We are grateful to the researchers Murray et al[1] as well as Stiegler and Gaba[2] who challenge our current thinking about teamwork, expertise, and decision making. We look forward to future research aimed at increasing insight into the cognitive underpinnings of decision making in acute and critical care settings.

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REFERENCES

1. Murray DJ, Freeman BD, Boulet JR, Woodhouse J, Fehr JJ, Klingensmith ME. Decision making in trauma settings: simulation to improve diagnostic skills. *Simul Healthc* 2015;10(3):139–145.

2. Stiegler MP, Gaba DM. Decision-making and cognitive strategies. *Simul Healthc* 2015;10(3):133–138.

3. Just MA, Carpenter PA. A theory of reading: from eye fixations to comprehension. *Psychol Rev* 1980;87(4):329–354.

4. Marquard JL, Henneman PL, He Z, Jo J, Fisher DL, Henneman EA. Nurses' behaviors and visual scanning patterns may reduce patient identification errors. *J Exp Psychol Appl* 2011; 17(3):247–256.

5. Henneman PL, Fisher DL, Henneman EA, et al. Providers do not verify patient identity during computer order entry. *Acad Emerg Med* 2008; 15(7):641–648.

6. Henneman EA, Cunningham H, Fisher DL, et al. Eye tracking as a debriefing mechanism in the simulated setting improves patient safety practices. *Dimens Crit Care Nurs* 2014;33(3): 129–135.

Eye Tracking to Acquire Insight Into the Cognitive Processes of Clinicians: Is "Looking" the Same as "Seeing"?

To the Editor:

We thank Ms. McAfee and Dr. Henneman for their suggestion that eye tracking may be relevant for studies such as that of Murray et al,[1] a focus of our recent editorial, *Decision-Making and Cognitive Strategies*.[2] The relationship between what stimuli attract gaze compared with what the decision-making clinician actually "sees," "retains," "understands to be significant," "interprets in context," and so forth is not well understood or predictable. With eye tracking, one can see what study subjects look at and in what order, as well as the duration of their gaze on different items. This has merit, to be sure, but also creates important questions. For example, when a subject lingers on something, should we interpret this to mean that the subject found it particularly important, particularly confusing, novel, or just more interesting to look at than the rest of the environment? Eye tracking can be a good way to collect data that are otherwise hard to capture, and it may be of particular use for psychomotor tasks in

which "eye-hand coordination" is paramount. However, it may not tell us very much about more complex decision-making processes of individuals or teams such as those in the study by Murray et al.[1] For addressing these kinds of issues, perhaps coupling eye tracking with a prospective think-aloud protocol or retrospective interview protocol would be more informative. The retrospective inquiry of course might raise the question of potential bias in post hoc rationalization of one's own gaze trails. Hence, we agree that eye tracking can be a useful technique for some kinds of simulation-based (or clinic-based) studies, but its applicability to those about complex decision making is certainly an area in which more research is needed.

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REFERENCES

1. Murray DJ, Freeman BD, Boulet JR, et al. Decision making in trauma settings: simulation to improve diagnostic skills. *Simul Healthc* 2015; 10:139–145.
2. Stiegler MP, Gaba DM. Decision-making and cognitive strategies. *Simul Healthc* 2015;10:133–138.