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Engaging Data, How Practitioners Resolve Complex Information

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BACKGROUND: Expertise is more than knowledge; it includes the ability to analyze information and perform a task (cognition) with superior results (Hutchins). Knowledge and results are quantifiable but expertise is not. Because medical research is focused on quantitative rather than qualitative metrics, medical expertise is rarely studied. There are, however, models of cognition that can explain observed expertise. Certain tasks permit us to observe expertise and apply experimental models (Newell & Simon). We chose the task of preoperative anesthesia assessment as our method for exploring expertise.

METHODS: Subjects with varying levels of experience were recruited to perform a simulated preoperative assessment. Clinicians were asked to think aloud as they worked. Sessions were video-taped and analyzed for recurring patterns, themes, and cognitive activities.

RESULTS: Strategies varied between individuals but clinicians consistently organized data into coherent patterns, drew connections and demonstrated components of cognitive theory. They organized information to complement the anesthetic plan. Approaches varied according to experience. The more senior the clinician, the more likely they were to dwell on context and on inconsistencies in the pattern or to state a conclusion and a plan of action. For example, during the initial card arrangement, attendings spent an average of 23 seconds on potential medication-disease disconnects while residents and CRNAs spent 11 and 8 seconds respectively. Medical students spent a similar amount of time but focused on their lack of experience as to how the information fit together.

DISCUSSION/CONCLUSION: Rather than being passive recipients of data, expert clinicians actively engage, correlate and prioritize information from multiple sources, recognizing patterns and creating mental models of patients. Differences between senior clinicians and trainees suggest that these cognitive skills require ongoing experience to develop. The increased time spent by attendings evaluating disconnects might reflect a focus on problems because of their supervisory role or a different diagnostic approach to medication data. Such experience-based cognition is consistent with existing cognitive theory (Klein, Hutchins), and suggests that efforts to improve patient safety, such as medication reconciliation initiatives, need to explore and supplement existing expertise.

REFERENCES:

Hutchins E. Cognition in the Wild. Cambridge, MA: MIT Press, 1995.

Klein G. Sources of Power. Cambridge, MA: MIT Press, 1999.

Newell A & Simon HA. Human Problem Solving. Englewood Cliffs, NJ: Prentice-Hall, 1972.

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