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EDITORIALS

New approaches to the development of expertise in anaesthesia

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For many, the experience of training to become an anaesthetist has changed little over the decades. We continue to rely heavily on lectures and reading to acquire factual knowledge. We value logical approaches in clinical reasoning such as the hypothetico-deductive or Bayesian probabilistic models, and have some mistrust of the intuitive pattern recognition of experts.[1] Furthermore, we rely heavily on learning from clinical experience, which can be *ad hoc*, and opportunistic. "Putting in the hours" remains the cornerstone of becoming a consultant, and concerns have been rightly raised about the impact of shorter working hours on the development of expertise.

In their article "The Impact of a Perceptual and Adaptive Learning Module on Transesophageal Echocardiography (TEE) Interpretation in Anaesthesiology Residents: A Pilot Study" Romito and colleagues[2] present us with a different way of doing things, with potentially far-reaching implications for training and continuing education. The authors evaluate a well-designed and very repeatable educational intervention, aimed at improving diagnostic accuracy in TEE. This is a pre-post test interventional study, with a control group who received traditional training. It is small, non-randomized, and single institution, and yet the underlying educational theory and the impressive gains in learning are intriguing.

Kellman and Garrigan[3] state in their review of perceptual and adaptive learning that "with practice in any domain, humans become attuned to the relevant features and structural relations that define important classifications, and over time we come to extract these with increasing sensitivity and fluency". Romito and colleagues[2] presented trainees with multiple unique video clips of TEEs across 10 categories of diagnosis and probe orientation. When three images in any category were correctly classified within a minimally acceptable time, no further images in that category were presented. The process continued until all categories were mastered, thus ensuring that all trainees achieved both accuracy and fluency in the correct classification of these TEE video clips by the end of the intervention. This reportedly took around 30 min. This short intervention had quite a remarkable effect, which was still evident after six months. This somewhat surprising result is reflected in similar studies in other diagnostic domains which rely heavily on visual recognition.

In essence, Romito and colleagues[2] describe a deliberate intervention, drawing on well described theories of learning and cognition from the psychology literature. They suggest there are smarter ways of developing expertise, at least in some domains of practice, and challenge the traditional ways of doing things. Pattern matching is a recognised component of clinical reasoning.[4] Pattern matching is effort-free, automatic and comes naturally to both novices and experts. The more previous exposures we have to particular patterns of presentation, the more likely we are to be right. Experts are better able to identify the key information and relationships between items in an image or situation than novices, and this improved perception and grasp of relationships leads to more accurate diagnosis. What is novel in Romito and colleagues'[2] article, is the deliberate harnessing of this natural process to deliberately fast-track expert pattern matching.

Pattern matching has received some bad press. Firstly, in our scientific paradigm we value the logical and systematic collection of evidence, which is then interpreted using evidence based approaches to produce a defensible diagnosis. A gut feeling is difficult to make explicit or defend. It is also not so easy to teach. When the diagnosis depends on having seen something before on many occasions, how do we guide our students? Also, pattern matching crops up as the downside of expertise, particularly in crisis management.[5] We talk about frequency gambling and fixation errors, where clinicians fail to consider alternatives. We know recency or frequency of exposure to particular events can bias our interpretation of a situation. Norman[6] suggests that we may need to protect ourselves from our tendency to automatic diagnosis, with mindful warnings to ourselves to think what else it could be, or look for contradictory evidence. Crisis algorithms guide us through a systematic approach to diagnosis to avoid fixation on a single, wrong diagnosis.

Turning back to TEE, what would happen if the trainees were presented with a different, novel condition? Would the PALM intervention prepare them adequately to put something into an "other" category, to think what else it could be, or look for contradictory evidence? Would this prompt a return to logical reasoning or force a "best-fit" into one of the categories? How does perceptual adaptive learning theory deal with uncertainty? A further question raised by Romito and colleagues[2] study is decay in learning. A strong effect was found immediately post-intervention which persisted, though somewhat decayed, at six months. What is the optimal time for "top-up training" and how long would it take? What does it take to maintain expertise? And finally, in what contexts could perceptual adaptive learning techniques be usefully applied? Is it just visual as in TEE, X-Rays and ECGs, or could it be more applied to physical features, patterns of physiological data or a particular combination of events? Consider predicting the difficult airway. Our algorithmic approaches and scoring systems do seem to come up wanting here.[7] Do experts do better than novices? Would a difficult airway PALM be worth exploring?

Romito and colleagues[2] study challenges our approaches to traditional training and speaks more to deliberate approaches to the development of expertise. What impact could smarter educational approaches have on training duration? Could self-directed PALM programmes have a place in Continuing Professional Development? The work is novel, relevant to all anaesthetists involved in training programs, and contributes valuable knowledge to educational approaches to learning TEE. This small study opens up a fascinating area for educational research, with the potential to revolutionise our traditional approaches to learning in anaesthesia.

Declaration of interest

None declared.

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Psychological assessment to identify patients at risk of postsurgical pain: the need for theory and pragmatism

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There is good evidence that acute postoperative pain predicts the development of chronic pain after surgery, across both a number of surgical indications and procedures. Indeed, it appears that 'pain predicts pain'.[1] Thus, adequate management of acute pain after surgery is doubly important. Efforts to identify empirically those patients most likely to experience relatively severe acute and chronic pain after surgery might facilitate screening of at-risk patients. Ultimately, this knowledge might lead to more effective pain management for those identified as needing particular care.

It is now widely appreciated that psychological factors play an important role in the experience of pain.[2] Evidence for this includes studies demonstrating that psychological factors measured before surgery can predict the experience of both acute and