Expert Reasoning in the Context of Ill-Structured Clinical Problems: Exploring the Experiences and Sources of 'Comfort with Uncertainty'

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Presenter: Jonathan S. Ilgen
Moderator: Edwin Betinol
Time: 12:45 – 1:00

Background: To act with confidence while simultaneously remaining uncertain is a paradox that epitomizes expert practice. Yet how experts comfortably navigate complex, ill-defined problems remains poorly understood. We sought to examine the behaviors of experts who work in settings rife with uncertainty, exploring what they do to work "comfortably" despite lingering uncertainties.

Methods: We employed a constructivist grounded theory (CGT) approach to explore experiences of uncertainty in emergency medicine (EM) faculty. We used a critical incident technique (CIT) to elicit narratives about decision-making immediately following participants' clinical shifts, exploring how clinicians made judgments about whether problems were within their scope of practice, when they felt compelled to enlist others' help, and how they determined when a problem should be triaged to others. Two investigators analyzed the narrative transcripts, coding data line-by-line using constant comparative analysis to organize transcripts into focused codes, key conceptual categories, and then major themes.

Results: Participants identified multiple forms of uncertainty, organized around conceptualizations of the problem they were facing and the actions they would consider taking in those moments. They described iterative cycles of forward planning and monitoring that generated variable levels of comfort with the situation. This spectrum of comfort in led to a variety of responses: owning the problem with comfort, co-owning the problem with others, triaging the problem to others, or moving forward despite discomfort.

Implications: Clinicians experience multiple forms of uncertainty. Their multitude of potential responses are informed by variable levels of comfort that result from real-time self-monitoring and forward planning.

Integrating Extensive Forms of Basic Science to Support the Development of Clinical Reasoning

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Presenter: Zarah Chaudhary
Moderator: Edwin Betinol
Time: 1:00 – 1:15

Purpose: Instruction that deliberately integrates basic science mechanistic knowledge with clinical features (signs and symptoms) enables robust cognitive representations in novices and has been shown to support the development of diagnostic ability and later learning of new related concepts. However, studies have only utilized traditional biomedical knowledge (anatomy, physiology, biochemistry) while the value of behavioural and sociological sciences proposed to be necessary for effective care remains unexplored. We compared integrated instruction of extended forms of basic science (EBS) to clinical-features only instruction (CF) on diagnostic performance and on preparation for future learning (PFL).

Methods: 33 first-year medical students were randomized to the EBS or CF group to learn medical psychiatry disorders (co-occurring physical and mental health conditions). Initial Assessment (IA) consisted of diagnosing 14 clinical vignettes. In a second learning phase, all students learned how to evaluate health care needs for complex patients using the same 4-part framework. In a PFL assessment, students addressed patients' health needs by rating (0-3) the clinical significance of variables from the framework.

Results: We found no difference between the EBS and CF groups on IA ($t(30)= 1.20$, $p= 0.24$). On PFL assessment, integrated instruction of EBS lead to superior performance assessing complex patients' health care needs $t(30)= 2.70$, $p < 0.05$.

Discussion: Our data suggest that integration of EBS supports the development of diagnostic ability similar to previous studies utilizing biomedical sciences and that it can enhance later learning of new related concepts. This has implications for designing curricula that support expert clinical reasoning.

Learner Centered Objective: Participants will be able to understand the value of extended forms of foundational basic science knowledge, including behavioural and sociological sciences to support learning and performance

A Randomized Control Trial of Non-Surgical Methods of Non-Dominant Hand Training to Enhance Laparoscopic Skill

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Presenter: Neeraj Mehra
Moderator: Edwin Betinol
Time: 1:15 – 1:30

Objective: To determine if non-dominant hand training using task-specific exercises or everyday activities, would translate to improved laparoscopic ambidexterity amongst medical trainees.

Methods: A single centre non-blinded, randomized control trial was conducted. 100 medical students were block randomized to receive either 1) Task-specific exercises to train the non-dominant hand, 2) Directions to use their non-dominant hand to perform everyday activities, or 3) No training. Laparoscopic skills during completion of pre-defined tasks were assessed using a box-trainer fitted with motion tracking equipment. Three time points were measured; pre-training, post-training (t = 3 weeks), and retention (t = 6 weeks). A principal components analysis incorporating extreme velocity and acceleration events was performed to assess multidimensional hand movements and obtain a global metric of ability i.e. smoothness of motion. We compared smoothness between groups and across times using mixed-effect linear regression, controlling for pre-test ability

Results: There was a significant improvement in smoothness from the post-test phase to the retention phase for all groups (mean effect size d = 0.34), suggesting that smoothness was improving over time regardless of intervention. However, there was no difference in smoothness between the control group and either task-specific exercises or everyday activities for any task at any time point (all $p > 0.05$, mean task-specific effect size d = 0.14, mean everyday effect size d = 0.04).

Conclusion: While sound in theory, training of the non-dominant hand to improve ambidexterity does not translate to the laparoscopic surgical environment. Simulation based laparoscopic exercises remain the favored education modality.

Supporting Sustainable Learning in the Hands-On Ultrasound Education for Emergency Medicine Program (HOUSE EM)

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Presenters: Alissa Burrows
Moderator: Edwin Betinol
Time: 1:30– 1:45

Point-of-Care Ultrasound (PoCUS) is a bedside procedure and valuable tool that can be used to assist clinical assessments, especially in rural emergency departments that are often under resourced. The Hands-On Ultrasound Education for Emergency Medicine course (HOUSE EM) gives rural physicians the training and confidence to integrate PoCUS into their practice. HOUSE EM was specifically designed to be practical, customizable, and community-based to meet the varied needs of rural physicians and their communities. However, one challenge faced by rural physicians is sustaining specific clinical skills, such as using PoCUS, due to the lack of opportunities in low volume centres.

One goal of HOUSE EM is to support sustainable PoCUS education. In an effort to assess the impact of HOUSE EM on participants and their communities, and to ascertain the learning needs of rural physicians post-course, an evaluation project is currently being conducted, involving over 50 semistructured interviews with physician participants and other stakeholders from 24 communities.

The interviews will be thematically analyzed and will indicate how HOUSE EM can better support physicians' learning needs during the course, as well as how the program can support continued learning in order to sustain and enhance PoCUS skills post-course. The findings will directly inform a set of recommendations that will shape the development of future iterations of HOUSE EM, lead to strengthened support for sustainable learning and inform the landscape of future PoCUS medical education.

Key words: ultrasound, sustainable learning, rural