#4I Short Communications: Clinical Reasoning 1

Location: Room 101 a/b

#4Ii (3170)
The Glasgow Case Portfolio: A bespoke educational scaffold to develop clinical reasoning skills in undergraduate medicine

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Background: The ability to undertake and record a comprehensive clinical assessment by engaging in the clinical reasoning process is fundamental to clinical practice. We used the concept of the zone of proximal development to design an educational scaffold to aid teaching this skill to medical undergraduates entering their clinical phase.

Summary of work: Dual process theory was used as a conceptual framework to develop the educational scaffold. A variety of clinical reasoning tools were integrated into a case portfolio proforma. These included hypothetico-deduction reasoning grids, problem lists, summary statements and SNAPPS. Prescribing and reflection tools also encouraged deliberate self-practice.

Summary of results: Students were satisfied with the layout of the proforma and felt it enabled them to think more deeply about the patient presentation and generate a management plan. Students also valued the opportunity to receive tailored feedback. Assessors valued insights into student ‘thought processes’ and proposed management plans, allowing constructive feedback.

Discussion: The Glasgow Portfolio Case proved to be a useful educational scaffold for teaching students to assimilate a wide range of clinical data, test and refute working hypotheses, formulate action plans and reflect on their practice. It allowed assessors insight into student’s thinking and encouraged the generation of individualized, constructive feedback.

Conclusion: Integration of clinical reasoning, prescribing and reflection tools into a case portfolio proforma encouraged the development of skills in clinical reasoning and reflective practice. It also offered a safe, workplace-based teaching of practical skills such as prescribing whilst offering assessors the opportunity to review practice and offer feedback.

Take-home message: The Glasgow Case Portfolio is an effective educational scaffold for teaching clinical reasoning and encourages safe prescribing and deliberate self-practice.

#4I1 (2202)
A practical way to enhance the intraoperative teaching and learning-anatomy-based clinical reasoning

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Background: Intraoperative (intraop) training is the most important part of surgical education, however, it is highly variable and individualized, and there are only a few data to discuss it. The aim of this study is to assess the intraop teaching and learning effectivity by using the anatomy-based clinical reasoning teaching method.

Summary of work: Anatomy-based clinical reasoning teaching with LSRWD (Listening: preop briefing/postop feedback, Speaking: anatomy structure, Reading: learning readiness, Writing: recording procedures, Doing: surgical skills) in the OR were applied in 36 clerks. Scoring of clinical core competencies, satisfaction rate, and questionnaire were analyzed and compared with the control group.

Summary of results: All students of the study group have higher competencies scores and satisfaction rate than the control group. They strongly felt being educated and welcomed as a teamwork member in the OR. Both trainers and trainees clearly know learning objectives and task allocation. Verbalized surgical procedures during op increased mutual interaction.

Discussion: Recently the shortage of surgeon is a worldwide serious problem, due to the workload, weekly working hours, and patient safety. Various efforts have been undertaken to attract the surgical new blood through effective surgical education. Our study showed intraop anatomy-based clinical reasoning education by LSRWD is highly reliable and satisfied.

Conclusion: Clerkship rotation in the surgical sub-specialist division is quite short, how to effectively enhance their learning performance is an important issue. Hands-on learning by doing through the LSRWD clinical reasoning teaching model significantly improved learners’ core competencies scores and learns expressed high interest in surgery in the future career choice.

Take-home message: Anatomy-based clinical reasoning teaching in the OR through "listening, speaking, reading, writing, doing" is an effective method for surgical education, this structured teaching and learning process is easy to remember, also easy to perform for both trainers and trainees. The learners significantly improved their clinical core competencies and self-directed learning ability.
#413 (2443)  
**Instructional approaches for the teaching of clinical reasoning: a randomised experiment**

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**Background:** Several instructional approaches have been proposed for the teaching of clinical reasoning, but little empirical evidence of their effectiveness exists. This two-phase experimental study investigated the effects on students’ diagnostic accuracy of three different approaches employed during practice with clinical cases: self-explanation, deliberate reflection, and simulation of practice.

**Summary of work:** 324 2nd-year Dutch medical students were randomly allocated to diagnose 8 clinical cases under one of 4 conditions: self-explanation (providing pathophysiological explanations), deliberate-reflection (contrasting alternative diagnoses), practice-simulation (hypothesising about gradually unfolded findings), and control (providing diagnosis). One week later, all students diagnosed 8 different cases of the same diseases.

**Summary of results:** Initial diagnostic accuracy significantly differed between conditions [range=0-6; mean (standard deviation): control=2.18 (0.93); deliberate-reflection=1.77 (0.91); self-explanation=1.93 (0.94); practice-simulation=2.03 (0.88)]; F(3,320)=2.91, p=.03. With the control condition performing significantly better than the deliberate-reflection condition. One week later, this pattern reversed [control=1.90 (1.15), deliberate-reflection=2.11 (1.16), self-explanation=1.98 (1.12), practice-simulation=1.65 (1.11)]; F(3,320)=2.91, p=.03.

**Discussion:** Deliberate reflection during practice with cases fostered diagnostic accuracy relative to providing diagnosis. The learning gain was such that led to better performance despite initial disadvantage. This finding is consistent with previous research but contradicts theoretically sound expectations of greater benefits of self-explanation for students at early phases of training.

**Conclusion:** The study provides experimental evidence of the value of deliberate reflection during practice with clinical cases for medical students’ learning of clinical diagnosis. Simulating a real encounter, the prevalent approach in clinical teaching, showed ineffective to foster learning. Potential accounts for the unexpected absence of effect of self-explanation demand investigation.

**Take-home message:** Having students reflecting upon clinical cases by comparing and contrasting alternative plausible diagnoses fosters learning relative to more conventional approaches. Despite being the most common approach employed for the teaching of clinical reasoning, the simulation of a real clinical encounter with gradual unfold of clinical findings remains without empirical support.

#414 (416)  
**Can students’ stages of development of clinical reasoning inform curriculum development?**

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**Background:** The support students need to develop clinical reasoning skills varies with their level of training. We are reviewing our teaching of clinical reasoning and wished to establish the timing of the different stages of development of clinical reasoning at our school.

**Summary of work:** Twenty-three students from year 2, 3, and 6 in our undergraduate programme interviewed a simulated patient who modelled a straight-forward and a complex presentation. Forty-six transcripts of the audio recordings were analysed for differences in information gathering and how students used the information to diagnose.

**Summary of results:** Junior students asked almost as many questions as senior students. The senior students had more accurate initial diagnoses, more focussed questioning and more correct diagnoses. They considered a broader differential diagnosis, actively excluded other possibilities, showed greater flexibility in thinking, compared and contrasted more and ignored inconsistent features less often.

**Discussion:** The different stages in the development of clinical reasoning are considered to be due to differences in knowledge. We have shown differences in how students gather and use information at different levels of training. These differences can inform teaching and provide criteria for assessment of clinical reasoning.

**Conclusion:** We believe we have identified some modifiable differences in clinical reasoning between junior and senior students and have modified our teaching accordingly. Further research is needed to show if incorporating these differences into teaching enhances the learning of clinical reasoning.

**Take-home message:** Reviewing clinical reasoning at different levels of training informs teaching and can help guide the development of criteria for assessment.
Scientific Reasoning in Medical Education: A Novel Approach for the Analysis of Epistemic Activities in Clinical Case Discussions

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Background: Scientific reasoning and argumentation (SRA) has been described as a compound of scientific discovery, scientific argumentation and the understanding of the nature of science (Engelmann 2016; Ouellette 2016). Since clinical reasoning incorporates the ability to reason scientifically, it can be seen as a specific kind of SRA (Barz 2016).

Summary of work: We used a novel SRA framework to investigate epistemic activities (EAs) of medical students by adapting a coding scheme from social work to the context of Clinical Case Discussions (CCDs), a peer teaching format designed to foster epistemic activities such as evidence evaluation or hypothesis generation (Fischer 2014; Ghanem 2016).

Summary of results: In three analysed CCDs the students engaged themselves predominantly in Evidence Generation (EG, 34%), Communicating/Scrutinising (CS, 26.2%), Questioning (Q, 22.4%) and Evidence Evaluation (EE, 12.4%). The peer-teachers were drivers of EG, CS and Q, whereas students engaged mostly in EE, Hypothesis Generation (HG), Drawing Conclusions (DC) and Problem Identification (PI).

Discussion: The distribution of EAs seems to reflects a realistic reasoning process of clinicians. It is notable that peer-teachers pursue mainly EAs like EG or CS, while participants predominantly carry out EE and HG, which were identified by Kind as crucial for clinical reasoning (Kind 2013).

Conclusion: The coding scheme, based on the SRA framework by Fischer et al. provided a useful analytical tool to investigate clinical reasoning in medical education (Fischer 2014, Ghanem 2016). CCDs can be seen as a far-reaching teaching format in respect to the rich use of various indispensable SRA activities.

Take-home message: An in-depth analysis of SRA, respectively clinical reasoning activities is feasible. Valuable clinical reasoning activities such as EE or HG can be triggered through CCDs. This underlines that CCDs are an appropriate format to teach clinical reasoning skills to medical students.

Assessing Clinical Judgement – a novel approach to learning and assessment

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Background: Consultations in primary care (PC) are complicated by rich contextual factors. Student integration of clinical reasoning and clinical judgement in complex decision-making is difficult to assess. The Clinical Judgement Test (CJT), based on methodology validated in other settings applies this pedagogy to a written assessment of clinical judgement in medical education.

Summary of work: We have developed and piloted a CJT with ~100 students over three rotations in a PC attachment. The CJT was evaluated psychometrically and through student evaluation to provide evidence of validity. The CJT has now been implemented as a summative assessment component of the programmatic assessment portfolio in the Community-term.

Summary of results: The pilot study identified a high degree of acceptability of the CJT format as an authentic assessment of clinical reasoning in primary care education. Students maintained that using practice questions for group discussion deepened their understanding of complex clinical reasoning. Psychometric evaluation supports the validity and reliability of the CJT.

Discussion: Clinical judgement is a core skill for clinicians. Traditional MCQ tests have limited value in testing skills other than knowledge. The CJT deepens student knowledge and more authentically assesses the clinical reasoning process. This assessment method also drives students to practice a clinical reasoning process and deepens understanding and engagement.

Conclusion: Assessing students’ clinical reasoning using a partial credit model is an authentic, fair, reproducible and innovative assessment technique that can readily be applied in other areas of health professional education. Use of the test questions for practice and discussion deepens student knowledge and more authentically demonstrates the clinical reasoning process.

Take-home message: Assessing students’ clinical reasoning using a partial credit model is an authentic, fair, reproducible and innovative assessment technique that can readily be applied in other areas of health professional education. Use of the test questions for practice and discussion deepens student knowledge and more authentically demonstrates the clinical reasoning process.