Using “Think Aloud” to Compare the Clinical Reasoning of Veterinarians and Veterinary Students

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Background: Clinical reasoning is a fundamental skill for all health professionals and is an expected competency of veterinary graduates. However, teaching clinical reasoning to students is difficult, particularly when the learner is unaware of much of the reasoning processes involved.

Summary of Work: A two part project involved focus groups with final year veterinary students exploring their experiences of learning clinical reasoning and a “think aloud” study investigating how clinical reasoning was practised. The clinical reasoning of veterinarians was compared with fourth year veterinary students during a standardised case. Participants performed an examination of a cow whilst “thinking aloud” at all times. The case was video-recorded and reviewed with the participant during a retrospective interview. Template analysis of transcripts from the cases and interviews was triangulated with mapping timestamped actions and communications of each participant.

Summary of Results: Thematic analysis of two focus groups (n = 4, n=11) identified the importance of clinicians signposting to students the strategies used in different case contexts and examples of pattern recognition; the influence of the learning context; and having opportunities to practise clinical reasoning in a safe environment. Findings from the cases (4 veterinarians, 5 students) identified students’ disorganised approach, struggle with ambiguity, and negative consequences of cognitive overload. In contrast, veterinarians used knowledge and experience to organise their information gathering and made decisions based on a rationale.

Discussion: The two studies have highlighted the importance of providing students with appropriate opportunities for case responsibility and signposting clinicians’ reasoning processes.

Conclusion: The use of focus groups and “think aloud” provided valuable insight into clinical reasoning and demonstrated that students have difficulty adopting a logical reasoning process.

Take Home Messages: “Think aloud” is a tool that is useful in research and can help signpost the clinical reasoning processes during appropriate teaching opportunities.
#4EE03 (135570)
**Which factors are most important for continuing the Tokyo GIM Conference (TGIM), a non-profit clinical reasoning study group held at multiple venues?**

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**Background:** Opportunities for undergraduate and post-graduate education in clinical reasoning are scarce in Japan. In order to improve this situation, we have been holding a clinical reasoning study group (the Tokyo GIM Conference) in the Kanto Region since 2011.

**Summary of Work:** TGIM is held every second Friday from 19:30-22:00 with the aim of providing learning opportunities in clinical reasoning. The participants are about 50 senior medical students and young physicians up to ten years after graduation. TGIM is a non-profit organization and receives no financial support from pharmaceutical firms or other sources. All publicity for the TGIM is conducted via Facebook and no operational expenses are generated. The venues for the conference are provided free of charge by the home institution of the organizer or case presenter.

**Summary of Results:** The following factors were identified as a result of the interview: Uniqueness-No other similar opportunity exists in the Kanto Region. Quality of Content-The case presentations are of a very high level. Existing model conference-The Kyoto GIM Conference served as a model. Voluntary contributions-The organizer and participants all contribute voluntarily to the selection of cases, selection of venue, FB posting, keeping minutes. Access/Venue-Mainly held in international milieu of Shinjuku in central Tokyo. Advertising/PR-Face Book is the major instrument for advertising the conference. The organizer as an independent party-The lack of financial or other sponsorship maintains the independence of the organizer.

**Discussion:** Time and labor contributed by the organizer and participants, providing of free venues by host institutions, FB updating, etc.) contribute largely to making the conference possible. Participation in this and other similar conferences is limited to a small portion of the total population of medical staff in Japan due to the restrictions imposed by employment schedules, etc. Such factors may impose limits on the future growth of these conferences.

**Conclusion:** The informal net-based interview conducted by the organizer revealed that uniqueness, quality of content, the existence of a model conference, the voluntary contributions of the organizer and participants, accessibility, advertising, and leadership of the organizer were the most important factors contributing to the success of the TGIM.

#4EE04 (134433)
**Evaluation of Surgery Intern’s Perception of Clinical Reasoning Activities at Universidad Andrés Bello, Viña del Mar, Chile**

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**Background:** Clinical reasoning is a cognitive step-driven competency, allowing doctors to reach diagnostic and treatment decisions and ultimately solve the patient’s health problem, and a core skill to be acquired during undergraduate school. We evaluated sixth year intern’s perception of clinical reasoning activities during a surgery practicum, at Universidad Andrés Bello’s Medical School.

**Summary of Work:** A clinical reasoning Likert type perception survey, which evaluated: clinical reasoning process, usefulness of methodology, and methodology structure, was administered with informed consent to 29 interns. Median, and standard deviation were used. Results were tabulated generating two groups, positive perception (generally agree and strongly agree) and negative (generally disagree and strongly disagree); leaving out the undecided. These values were calculated as a ratio.

**Summary of Results:** With a maximum of 5 points, the average was 4.1 for clinical reasoning process; 4.2 for usefulness and 3.9 for methodology structure. For the ratio positive v/s negative response clinical reasoning process was 7:1; usefulness 6:1 and methodology structure 6:1. Best evaluated activities were clinical reasoning joint reflection, with 100% agreement and applying clinical reasoning skills with adequate results in simulated situations, with a 13:1 ratio. Less positively evaluated were: amount of clinical reasoning activities and application in the daily rounds, with ratios 4:1 and 3:1 respectively.

**Discussion:** Overall intern’s perception is positive for all three areas. Items to improve are increasing clinical reasoning activities and it’s application in daily rounds with patients.

**Conclusion:** Perception of the methodology to train clinical reasoning is highly positive. It will help us to improve quality and quantity of the activity and to train tutors to use it in daily clinical tutoring with interns.

**Take Home Messages:** It would be useful to supplement with a qualitative study.
Development of a Method to Measure Clinical Reasoning in Pediatric Residents: The Pediatric Script Concordance Test

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Background: The Script Concordance Test (SCT) is an emerging method of assessment of clinical reasoning skills. SCT is designed to assess a candidate’s ability to reason when faced with decisions encountered in the three phases of clinical decision-making: diagnosis, investigation and treatment.

Summary of Work: The objectives were: 1) to examine the validity of Pediatric Script Concordance Test (PSCT) scores in discriminating clinical reasoning ability between junior and senior pediatric residents and experienced pediatricians, and 2) to determine if higher reliability could be achieved by applying specific strategies to SCT design. A 90-minute PSCT (24 cases/137 questions) was administered to 91 residents from 4 Canadian training centers. Each resident’s PSCT was scored based on the aggregate responses of 21 certified pediatricians (Panel of Experts (POE)). One-way analysis of variance (ANOVA) was used to a) determine if POE obtained higher scores than junior/senior residents and b) if senior residents obtained higher scores than junior residents. Reliability was calculated using Cronbach’s α coefficients.

Summary of Results: There was a statistical difference in performance across all levels of experience, F = 22.84 (df = 2); p < 0.001. The POE had higher scores than both senior (mean difference = 9.15; p < 0.001) and junior residents (mean difference = 14.96; p < 0.001). The senior residents outperformed the junior residents (mean difference = 5.76; p < 0.002). Internal consistency of the PSCT scores (independent of study site) was 0.85.

Discussion: PSCT scores (independent of study site) were able to discriminate clinical reasoning ability between pediatricians and two distinct training levels in pediatric residency. Solid reliability was also achieved.

Conclusion: The PSCT is a valid and reliable method to assess the core competency of clinical reasoning.

Take Home Messages: We suggest the PSCT may be effectively integrated into formative residency assessment and with increasing exposure, experience and refinement may soon be ready to pilot within summative assessments in pediatric medical education.

Learning clinical reasoning in the physiotherapy workplace: a qualitative study

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Background: Research on clinical reasoning has focused on frameworks underlying decision-making, accuracy of outcomes, educational strategies and preclinical assessment, yet little is known on learning clinical reasoning in the workplace. The purpose of this study was to explore undergraduate physiotherapy students’ learning of clinical reasoning during internships.

Summary of Work: A qualitative research design using focus groups and semi-structured interviews was employed to explore the perspectives on learning clinical reasoning of physiotherapy students and clinical teachers at the European School of Physiotherapy in Amsterdam. Four focus groups were held with undergraduates from years 2, 3 and 4. Eight clinical teachers were interviewed individually. Sessions were audiotaped and transcribed verbatim. Thematic analysis was employed to identify significant themes that emerged from the data.

Summary of Results: Preclinical training in clinical reasoning insufficiently prepared physiotherapy students to connect the whole process of clinical reasoning in real patients. Clinical teachers expected a holistic, multifactorial problem-solving approach, where students still needed to work on their physiotherapeutic knowledge and structure. Both students and teachers considered feedback and reflection prerequisite for the development of clinical reasoning in physiotherapy practice. Learning was hindered by time constraints, limited patient exposure and factors influencing communication in the workplace.

Discussion: Workplace-based learning of clinical reasoning in physiotherapy training follows the principles of experience-based learning, based on supported participation.

Conclusion: Physiotherapy students learn clinical reasoning in the workplace by comparing and reflecting on different approaches of clinical reasoning in practice. By synthesising these approaches with physiotherapeutic knowledge, students develop their own individual approach. These results have implications for teaching and the development of physiotherapy education.

Take Home Messages: Offering various approaches of clinical reasoning in the workplace, supported by reflection, enhances undergraduate students’ learning of clinical reasoning during internships.
#4EE07 (135722)
Script Concordance Testing and the Evolving Style Case: Is There a New Kid on the Block in Clinical Reasoning Assessment?

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Background: The Script Concordance Testing (SCT) is gaining momentum as a method of assessment of clinical reasoning. We introduced a new type of SCT case design, the evolving style case test (ESCT) whereby the patient’s clinical story is "evolving" and with thoughtful integration of new information at each stage, decisions related to clinical decision-making become increasingly clear.

Summary of Work: We aimed to: 1) determine whether an ESCT could differentiate reasoning ability among pediatricians, junior residents (JR) and senior residents (SR), 2) evaluate the reliability of an ESCT and 3) to obtain feedback related to its acceptability. A 12 case ESCT (embedded within a 24 case pediatric SCT), was administered to 91 pediatric residents (JR: 50; SR: 41); 21 pediatricians served on the panel of experts (POE). A one-way ANOVA was conducted across the levels of experience. Participant’s feedback on the ESCT was obtained using thematic analysis.

Summary of Results: Statistical differences existed across levels of training, F = 19.31 (df = 2); p < 0.001. The POE scored higher than SR (mean difference = 10.34; p < 0.001) and JR (mean difference = 16.00; p < 0.001). SR scored higher than JR (mean difference = 5.66; p < 0.001). Reliability (Cronbach’s α) was 0.83. Participants found ESCT engaging, easy to follow and true to the decision-making of clinical practice.

Discussion: The ESCT was effective in distinguishing clinical reasoning ability across three levels of experience. ESCT demonstrated very good reliability and acceptability.

Conclusion: ESCT is a valid, reliable and well-accepted assessment tool. We suggest increased utilization and refinement of the evolving style case may help to support SCT as an increasingly robust, engaging and relevant method for the assessment of clinical reasoning.

Take Home Messages: We propose ESCT may represent the true sequential timing and flow of medical practice, and therefore more closely simulate the reasoning processes of clinicians.

#4EE08 (135664)
Observing, interacting and learning in medical school; using reflection as a tool for finding the positive

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Background: Medical students are exposed during their training, to a variety of events, behaviors and experiences that can have a profound impact on their professional development and well-being. The aim of the study was to explore medical students’ most memorable experiences and the associated learning.

Summary of Work: Peer interviewing was used to assess medical students’ memorable experiences. Medical students’ were invited to narrate one memorable experience and reflect on the learning associated with it. All interviews were recorded, transcribed and analyzed thematically.

Summary of Results: 104 medical students participated in the study. 78 of them were females. 67.9% of the students were in the clinical years of Medical School. Students’ experiences derived from 3 types of interactions namely: observed interactions between doctors and patients, personal interactions between students and patients, interactions between doctors and students. Lessons deriving from the experiences included: treating patients as humans not as medical cases, the emotional aspects of care, doctors as role models, skills needed when working under pressure, ‘tasting’ the real profession and becoming a doctor, the importance of communication skills, teaching qualities of doctors, and reflections for future practice. Even though, the majority of experiences were not positive, when students reflected upon them, they focused on positive learning experience.

Discussion: Interactions with doctors and patients provided insight about the profession on a daily basis, the most common challenges, and the qualities necessary to succeed. All this implicit learning shapes medical students’ professional development.

Conclusion: Medical students are exposed to a wide range of experiences during their medical training. When students are asked to reflect on experiences, even negative ones, they can extract positive take home messages.

Take Home Messages: In the heart of memorable experiences are students’ interactions within the hospital environment. Encouraging students’ reflection can help them process negative experiences and support their professional development.
Conclusion: Through the process of reflection, the trainee realises how to exploit complex or adverse situations so that each event becomes an opportunity for concrete learning and self-development. In turn, this leads to improvements in decisions being made by these surgeons in their complex working environments.

Take Home Messages: Reflective ePortfolios encourage trainees to become active lifelong learners through the art of reflection combined with literature review so that they can deliver the best evidence-based approach in their surgical practice.

#4EE10 (133329)
The effects of reflection on clinical problems on medical students’ awareness of knowledge gaps and situational interest

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Background: Reflection on practice is considered a starting point for learning. By reflecting upon a problem at hand, students have the chance to identify knowledge gaps, which enhances interest in learning contents that may fill them (Schon, 1987). Interest determines students’ engagement in learning tasks (Rotgans & Schmidt, 2014). The role of reflection as interest trigger has been shown in other domains (Gloger-Frey et al, 2015), but empirical evidence of it in medical education is absent.

Summary of Work: We investigated whether structured reflection while practicing with clinical cases increases medical students’ awareness of knowledge gaps and situational interest in learning relevant contents. Forty-five 4th-year students from UNIFENAS-BH Medical School, Brazil, randomly assigned to either experimental or control group, diagnosed 6 clinical cases, either by following a structured-reflection procedure (Mamede et al, 2014) that requires matching the patient’s findings to alternative diagnoses (experimental group) or by providing a differential diagnosis (control group). Subsequently, all students rated, on two validated scales, their situational interest (Rotgans & Schmidt, 2014) and awareness of knowledge gaps (Gloger-Frey et al, 2015).

Summary of Results: Situational interest was significantly higher in the experimental than in the control group (range 1-5; respectively, mean=4.10, standard deviation=0.50 vs mean=3.66, standard deviation=0.48; p=0.005). The effect size was large (Cohen’s d=0.91). Awareness of knowledge gaps was higher in the experimental than in the control group, but the difference was not significant.
Discussion: Structured reflection upon to-be-solved clinical problems triggers students’ interest in knowing more about them. This may foster students’ engagement in learning. The increase in interest occurs even without enhanced awareness of specific knowledge gaps, a finding requiring further investigation.

Conclusion: Relative to making differential diagnosis, structured reflection while diagnosing cases increases medical students’ interest in learning more about them. Teachers can employ the structured-reflection procedure to foster reflection and situational interest among students.

Take Home Messages: Encourage structured reflection on to-be-solved clinical problems to enhance students’ interest in learning more about them.

#4EE11 (35943)
Learning to get a diagnosis in preclinical years

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Background: Clinical Reasoning, getting a diagnosis and being able to establish the fundamentals for treatment, prevention and rehabilitation is the principal competence of medical professionals.

Summary of Work: We designed an on-line course for second grade medicine students. It lasts eight weeks. At the beginning of each week students must use the intellectual abilities: identification, description, comparison, definition and classification to study a subject included in one of the basic courses they are attending in the same period. Later in the same week they analyze a clinical case, related to the subject they studied, applying a specific methodological approach in order to get a diagnosis.

Summary of Results: At the end of the course students are aware of the meaning, use and utility of each one of the intellectual abilities they applied to study as well as to solve a clinical case, being able to get a diagnosis and the fundamentals for the treatment, prevention and rehabilitation. And they learn to go into the entire process in an automatic way.

Discussion: The basics of clinical reasoning should be practiced from the basic sciences through the use of paper and pencil cases setting the pathogenesis and pathophysiology present in the patient’s condition.

Conclusion: It is possible for a student to develop Clinical Reasoning since the very first years in the medical school through the systematic use of intellectual abilities.

Take Home Messages: To design a course for preclinical students in which, by analyzing paper-pencil patient, they develop Clinical Reasoning getting a diagnosis and being able to establish the fundamentals for treatment, prevention and rehabilitation.

#4EE12 (35922)
Who knows physiology knows medicine.
Development of clinical reasoning in a physiology course

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Background: Who knows Physiology knows Medicine, with this phrase many teachers begin their Physiology course. Although all preclinical courses have a link with the clinic, in the case of Physiology this is very clear, in fact, Physiology books contents have always included examples of clinical application. With this in mind, we design a course to develop Clinical Reasoning by focusing in the importance of Physiology in clinical practice.

Summary of Work: Sixty clinical cases were written to cover the Physiology course content. The cases, along with questions regarding to the subject, was published on-line in the course page in advance to the class. During class, clinical cases were analyzed and the answers to the linked questions were discussed. Mid term and final exams consisted in clinical cases with questions related to the pathophysiology of the case.

Summary of Results: Through the daily use of Physiology knowledge to solve a clinical case, students learned to analyze a case by applying Physiology to explain the symptoms and signs presents in the patient, as well as being able to base the treatment. The class was more enjoyable, participatory and students developed the Clinical Reasoning through the learning of Physiology.

Discussion: The challenge of solving clinical cases is a great motivation to study, and the linked questions direct his/her attention to the physiological most relevant concepts. By using the same strategy to solve each case they learn to analyze them identifying the physiopathology and getting a diagnosis.

Conclusion: Solving a clinical case daily during the class allow students the development of Clinical Reasoning at the same time that they learn how to apply Physiology to solve a clinical case.

Take Home Messages: Who knows Physiology knows Medicine, so let’s start using clinical cases to learn Physiology.
#4EE13 (135842)
Consolidating Teaching in Clinical Reasoning through unpacking Clinical Educator thinking practices

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Background: Developing clinical reasoning abilities in students remains a key objective of clinical placements. However clinical teaching strategies are varied and are often not made explicit by educators. This may hamper student progress in clinical practice. By getting educators to examine their own thinking processes, it was hoped they would better understand what needed to be developed in their students.

Summary of Work: Educators involved in Undergraduate clinical teaching in Health and Rehabilitation Sciences attended a series of three workshops around clinical reasoning. The workshops focused on both theoretical concepts of reasoning as well as getting them identifying their own expert thinking processes. Pre and post workshop evaluations were completed to monitor impact.

Summary of Results: Workshops allowed clinical educators to unpack their own thinking models. Most educators did not realise there were frameworks to name the types of reasoning they utilised. Whilst educators could recognise the problems that students as novices had in reasoning through cases, they had less insight into the specific cues needed to guide reasoning.

Discussion: By understanding that their own thinking needed to be made visible, clinical educators could engage around their own practices and look at strategies to improve their teaching. The idea was entrenched that they needed to explicitly induct students into more expert thinking practices as a way of socialising them into the norms of the profession.

Conclusion: As students transition into clinical practice the workings of experts need to be made visible to them, to allow them to participate as legitimate members of their chosen profession. Common strategies where identified to enhance student teaching and make the development of clinical reasoning in students more overt.

Take Home Messages: Clinical educators need to consciously make their own thinking practices visible in order to improve student learning.

#4EE14 (135809)
Content Specificity of Clinical Reasoning in a Summative Internal Medicine Clerkship Structured Clinical Oral Examination

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Background: In an Internal Medicine (IM) clinical clerkship structured clinical oral examination (SCO), three of eight 9-minute stations test clinical reasoning (CR) skills involving patient management or diagnosis. Students interact with examiners in structured case discussions and scripted questions could require System 1 (intuitive pattern recognition) or System 2 (analytical) reasoning. It is assumed that System 1 reasoning occurs with a higher level of expertise and may be less common among novice learners. Little is known about the CR of clinical clerks and whether it is impacted by the specificity of the content being tested.

Summary of Work: During two separate IM 8-week clinical clerkship rotations, student performance (n=85) was computed for System 1 and System 2 CR components of the SCO. Other measures of CR (global rating, overall station, and overall examination performances) were also calculated. Pearson correlation coefficients between students’ performance in these CR components were determined. To establish possible congruence of CR ability within specific content being tested, correlation between students’ System 1 and System 2 performance will also be calculated for that subset of stations within which both types of questions existed.

Summary of Results: Mean marks for performance on System 1 tasks was 85.8% +/- 9.9 and for System 2 tasks was 84.5% +/- 10.2. There was poor correlation between these performance measures (r=.106). Calculated correlations limited to individual stations that contained both System 1 and System 2 questions will also be presented.

Discussion: Clinical clerk performance in questions testing System 1 and System 2 CR in IM was strong. However, the correlation between performance in each type of CR was poor when considered as an overall mean measure.

Conclusion: If this correlation improves when examined across isolated content domains, the impact of that content specificity may be important.

Take Home Messages: Content specificity may need to be considered when assessing CR skills in clinical clerkship rotations.
Promoting students’ clinical reasoning skills by withholding diagnosis information in PBL tutorials

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Hee Jung Son
Soon Jin Lee
Sang Hoon Lee
Taehee Han

Background: Medical school graduates should learn to deal with a chief complaint and make the correct diagnosis from possible diseases of the clinical presentation. However, limitation of PBL in training these skills has been noted because, for example, students are given a case of angina expecting that they will learn about the different diseases of chest pain. As an effort to overcome this limitation, we withheld diagnosis information in a PBL case. By doing so, we aimed to avoid concentrating on study of a single disease and emphasize differentials of a clinical presentation.

Summary of Work: Thirty-eight second-year medical students studied two different cases of patient problems during a gastroenterology PBL unit. During the tutorial of the first case, students discussed the scenario without diagnosis information [condition A]. For the second case, students were given full information from a chief complaint to final diagnosis and treatment [condition B]. We assessed students’ abilities to perform differential diagnosis (DDX) in the two conditions using MEQ.

Summary of Results: Students were given two patient scenarios that included history, PE and lab findings and asked to rank and justify differentials. The scenarios presented patients problems similar to the cases used during the PBL tutorials. Students achieved significantly higher scores on DDX when solving the case of condition A (M=2.88) compared to the case of condition B (M=1.86). They also showed better performance on diagnostic justification with the case of condition A (M=2.07) compared to condition B (M=1.74).

Discussion: Students were better at acquiring knowledge about differentials of a clinical presentation when final diagnosis was withheld in a PBL case.

Conclusion: Withholding diagnosis information in PBL tutorials can enable students to focus on studying the process of differential diagnosis rather than a single disease and to facilitate their clinical reasoning skills.

Take Home Messages: A PBL case may withhold diagnosis information to foster students’ competency in differential diagnosis and their clinical reasoning skills.

Can Clinical Reasoning be tested online? An interactive online tool to assess Clinical Reasoning in Musculoskeletal Physiotherapy

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Background: Clinical reasoning is defined as the thinking, analytical and decision-making process in clinical practice (Edgar, 2014). However, there is no structured assessment of clinical reasoning within the musculoskeletal physiotherapy setting.

Summary of Work: Three physiotherapists, each with more than seven years of musculoskeletal physiotherapy experience and postgraduate qualifications, created two musculoskeletal scenarios. These were inbuilt with quizzes that assessed different areas of clinical reasoning and was housed online. A cohort group of 120 physiotherapists were invited to participate within a two-month period. Implied consent was obtained. Before starting, participants completed a survey about their qualifications and experience. The aim was to determine if musculoskeletal postgraduate qualification and work experience could affect performance in the two scenarios. Significant level was set at p<0.05.

Summary of Results: 33 participants aged 27.7±3.5, completed both scenarios. The results were normally distributed, and independent t-test and Pearson correlation were used. The participants with musculoskeletal postgraduate qualification (n=7), attained higher overall scores (57.8% versus 66.3%) in Scenario 2 (t=2.153, p=0.039), especially the components that tested clinical reasoning (t=2.995, p=0.005). Increased work experience was related to the overall score of Scenario 1 (r=0.367, p=0.04), and the reasoning components in Scenario 1 (r=0.38, p=0.03) and Scenario 2 (r=0.35, p=0.04). However, there was no correlation between specific musculoskeletal experience with performance in both scenarios.

Discussion: Musculoskeletal postgraduate qualification appeared to increase Scenario 2 scores, and not Scenario 1. This could be related to the higher weightage of scores for observation and interpretation in Scenario 2 (0.76 versus 0.58).

Conclusion: Future studies should examine the structuring of the scenarios, including the structuring of the questions and weightages. This tool can be further evaluated against other workplace-based assessment tools like the Mini CEX.
#4EE15 (135212)
Promoting students' clinical reasoning skills by withholding diagnosis information in PBL tutorials

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Background: Medical school graduates should learn to deal with a chief complaint and make the correct diagnosis from possible diseases of the clinical presentation. However, limitation of PBL in training these skills has been noted because, for example, students are given a case of angina expecting that they will learn about the different diseases of chest pain. As an effort to overcome this limitation, we withheld diagnosis information in a PBL case. By doing so, we aimed to avoid concentrating on study of a single disease and emphasize differentials of a clinical presentation.

Conclusion: Students were better at acquiring knowledge from a chief complaint to final diagnosis [condition A]. For the second case, students were given full information from a chief complaint to final diagnosis and treatment [condition B]. We assessed students’ abilities to perform differential diagnosis (DDX) in the two conditions using MEQ.

Summary of Results: Students were given two patient scenarios that included history, PE and lab findings and asked to rank and justify differentials. The scenarios presented patients problems similar to the cases used during the PBL tutorials. Students achieved significantly higher scores on DDX when solving the case of condition A (M=2.88) compared to the case of condition B (M=1.86). They also showed better performance on diagnostic justification with the case of condition A (M=2.07) compared to the case of condition B (M=1.74).

Discussion: Students were better at acquiring knowledge about differentials of clinical presentation when final diagnosis was withheld in a PBL case.

Take Home Messages: A PBL case may withhold diagnosis information to foster students' competency in differential diagnosis and their clinical reasoning skills.

#4EE16 (135132)
Can Clinical Reasoning be tested online? An interactive online tool to assess Clinical Reasoning in Musculoskeletal Physiotherapy

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Taehee Han

Background: Medical school graduates should learn to deal with a chief complaint and make the correct diagnosis from possible diseases of the clinical presentation. However, limitation of PBL in training these skills has been noted because, for example, students are given a case of angina expecting that they will learn about the different diseases of chest pain. As an effort to overcome this limitation, we withheld diagnosis information in a PBL case. By doing so, we aimed to avoid concentrating on study of a single disease and emphasize differentials of a clinical presentation.

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Background: Medical school graduates should learn to deal with a chief complaint and make the correct diagnosis from possible diseases of the clinical presentation. However, limitation of PBL in training these skills has been noted because, for example, students are given a case of angina expecting that they will learn about the different diseases of chest pain. As an effort to overcome this limitation, we withheld diagnosis information in a PBL case. By doing so, we aimed to avoid concentrating on study of a single disease and emphasize differentials of a clinical presentation.

Summary of Work: Thirty-eight second-year medical students studied two different cases of patient problems during a gastroenterology PBL unit. During the tutorial of the first case, students discussed the scenario without diagnosis information [condition A]. For the second case, students were given full information from a chief complaint to final diagnosis and treatment [condition B]. We assessed students’ abilities to perform differential diagnosis (DDX) in the two conditions using MEQ.

Summary of Results: Students were given two patient scenarios that included history, PE and lab findings and asked to rank and justify differentials. The scenarios presented patients problems similar to the cases used during the PBL tutorials. Students achieved significantly higher scores on DDX when solving the case of condition A (M=2.88) compared to the case of condition B (M=1.86). They also showed better performance on diagnostic justification with the case of condition A (M=2.07) compared to the case of condition B (M=1.74).

Discussion: Students were better at acquiring knowledge about differentials of a clinical presentation when final diagnosis was withheld in a PBL case.

Conclusion: Withholding diagnosis information in PBL tutorials can enable students to focus on studying the process of differential diagnosis rather than a single disease and to facilitate their clinical reasoning skills.

Take Home Messages: A PBL case may withhold diagnosis information to foster students’ competency in differential diagnosis and their clinical reasoning skills.

#4EE16 (135132)
Can Clinical Reasoning be tested online? An interactive online tool to assess Clinical Reasoning in Musculoskeletal Physiotherapy

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Background: Clinical reasoning is defined as the thinking, analytical and decision-making process in clinical practice (Edgar, 2014). However, there is no structured assessment of clinical reasoning within the musculoskeletal physiotherapy setting.

Summary of Work: Three physiotherapists, each with more than seven years of musculoskeletal physiotherapy experience and postgraduate qualifications, created two musculoskeletal scenarios. These were inbuilt with quizzes that assessed different areas of clinical reasoning and was housed online. A cohort group of 120 physiotherapists were invited to participate within a two-month period. Implied consent was obtained. Before starting, participants completed a survey about their qualifications and experience. The aim was to determine if musculoskeletal postgraduate qualification and work experience could affect performance in the two scenarios. Significant level was set at p<0.05.

Summary of Results: 33 participants aged 27.7±3.5, completed both scenarios. The results were normally distributed, and independent t-test and Pearson correlation were used. The participants with musculoskeletal postgraduate qualification (n=7), attained higher overall scores (57.8% versus 66.3%) in Scenario 2 (t=2.153, p=0.039), especially the components that tested clinical reasoning (t=2.995, p=0.005). Increased work experience was related to the overall score of Scenario 1 (r=0.367, p=0.04), and the reasoning components in Scenario 1 (r=0.38, p=0.03) and Scenario 2 (r=0.35, p=0.04). However, there was no correlation between specific musculoskeletal experience with performance in both scenarios.

Discussion: Musculoskeletal postgraduate qualification appeared to increase Scenario 2 scores, and not Scenario 1. This could be related to the higher weightage of scores for observation and interpretation in Scenario 2 (0.76 versus 0.58).

Conclusion: Future studies should examine the structuring of the scenarios, including the structuring of the questions and weightages. This tool can be further evaluated against other workplace-based assessment tools like the Mini CEx.
Take Home Messages: Formal musculoskeletal postgraduate qualification and work experience could improve performance of an online scenario tool. The online tool needs to be further assessed with other workplace-based assessment.

#4EE17 (136265) Case-based Discussion for improvement of clinical reasoning in residents of family medicine in Rio de Janeiro

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Background: Clinical reasoning in primary health care (PHC) is known as a basic skill to be developed in family medicine residents (Year 1, R1 and 2, R2). Clinical reasoning in PHC presents with some peculiarities that must be identified and trained. Non-specific symptoms and restriction of diagnostic research resources are examples of factors that influence the clinical reasoning in PHC. This study aims to describe the experience of Case-based Discussion (CbD) with residents at a family clinic in Rio de Janeiro.

Summary of Work: The sessions take place daily at the end of the day, lasting 30 minutes. R1 and R2 must present cases selected during the day. They are encouraged to systematically provide a clinical vignette to summarize the case. Some questions are asked and suggestions made by those participating in the activity. Facilitators try to observe the steps of clinical reasoning, sometimes neglected, which interfere in the process. A feedback is offered to resident presenter at the end. All cases, referrals and diagnosis are duly registered.

Summary of Results: Residents train creating clinical vignettes, which facilitates the clinical reasoning process. Resource management and communication skills are worked out in discussions, in addition to clinical competence.

Discussion: It is noticed that exhaustive exercise to describe cases in a systematic manner is beneficial in the development of enthrustable professional activities. Less experienced residents observe the decision-making process of the most experienced. Complex cases presented can be seen by the professional once everyone is familiarized with it. An increase on therapeutic strategies emerged from the shared discussion.

Conclusion: CbD in a systematic way help in the development of clinical reasoning, and better quality of care offered by family medicine residents under indirect supervision.

Take Home Messages: Case-based Discussion can improve the clinical reasoning of family medicine residents.

#4EE18 (135098) Are thinking skills related to the students' academic performance level?

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Background: Thinking skills (TS) are cognitive components required to develop the higher order intellectual process called clinical reasoning. Researchers’ reports indicate that academic programs devoted little attention to TS teaching and assessment in the medical curriculum. Students do not develop spontaneously TS, specific teaching methods are required. Teachers should be trained to help students to develop TS.

Summary of Work: Study had two phases: Phase 1: Results of three formative tests applied along the academic year, were analyzed from 1005 second-year medical students. 220 MCQs were classified: 86 were on recall of information; 124 were on comprehension; and 10 on knowledge application to clinical vignettes. Alpha coefficient exams were from .80 to .90. Phase 2: Fifty eight second-year medical students participated in a one-hour simulated clinical case. They were from three different performance levels groups: 13 high, 33 medium and 12 low. A 13-items rubric was used made based on: team work, patient risk factors, diagnosis, clinical reasoning, basic-clinical knowledge integration.

Summary of Results: Phase 1. All TS scores increased in tests 1 and 2. ANOVA showed (p = .00) differences in exam 3: comprehension decreased, information recall remained stable. Application of knowledge scores decreased in all groups and no differences were found in high and medium performance level groups. Phase 2. ANOVA showed no differences (p = .00) between groups in: diagnosis and basic and clinical knowledge integration. High and medium performance level groups performed better in team work. Low level group performed better in risk factors and had the highest score in clinical reasoning

Discussion: Literature indicates that knowledge and thinking skills are linked factors. It is recognized that TS are basic components of clinical reasoning, however there is not agreement in which are academic TS related to this.

Conclusion: There were better performances in medium low groups in TS in tests scores, results do not reflect the performance level to which students belong. This finding indicates that TS are not related to the performance level of students.

Take Home Messages: Future studies on thinking skills among students should be made in order to determine if students use more complex thinking skills when they are facing complex tasks.