

**7J Short Communication:
Subjects in Curriculum**

Location: MR 116 – P1

#7J1 (133251)

Innovative, integrated, interdisciplinary – a novel approach to genomics teaching in the undergraduate medical curriculum

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Background: The field of genomic medicine raises complex social and ethical issues that medical students need to explore (1-5). However, the focus of genetics teaching within the undergraduate medical curriculum is often the molecular basis of genetics, testing and gene therapy (1, 4). Many students have trouble identifying key ethical issues associated with genetic cases and demonstrate a lack of understanding of implications for patients and their families of routine genetic tests (1, 5, 6).

Summary of Work: Our aims were to develop an interactive session to allow students to explore the biological, social and ethical aspects of genetics contextualised by current guidelines and clinical practice. Six genetic cases with biological questions and role-plays were developed. Each case focused on a different ethical issue and was presented by students in peer groups followed by a plenary discussion with a genetic counsellor. Students' experiences were evaluated.

Summary of Results: Thirty-one students participated in the study and twenty-three completed the evaluation questionnaire. All students felt the symposium helped them identify and discuss ethical issues. 96% of the students felt the session helped identify and practise effective communication in a healthcare setting and 95% felt the session helped explore ethical implications of genetic diseases for patients and families. 57% of the students felt the session helped them explain the molecular mechanisms associated with gene therapies.

Discussion: Exploring ethical issues of current genomic practice for patients, families and society should be embedded within undergraduate medical education to allow students to identify and consider key ethical issues contextualised by clinical practice and current guidelines (1, 5, 6).

Conclusion: Use of case studies, role-plays and peer learning can facilitate this (2, 3).

Take Home Messages: Integrated genomics teaching in the medical curriculum can help students understand and communicate the implications for patients and their families of routine genetic tests. Developed resources available.

#7J2 (132332)

Innovation in medical school: Should we be teaching students computer coding?

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Background: The ability to construct computer programs ("coding") is a key skill in a digital world. Coding is taught to primary-school children worldwide, but the current generation of medical students usually lack coding skills. Innovative technology such as apps, interactive websites and custom-built research tools are frequently used by patients, healthcare professionals and researchers. However, doctors can understand or write software. We sought to teach medical students to code to help meet this deficit.

Summary of Work: We developed a 2-day course to teach self-selected cohorts of medical students basic coding and assessed them with a simple project. We explored in a focus group whether students thought that coding has a place in the undergraduate curriculum.

Summary of Results: Course instructors found the students receptive and easy to teach coding and both staff and students considered that they had gained some basic coding skills from the course. Four major themes emerged from the focus group 1) Understanding of coding 2) Medical School's role 3) The future 4) Concept of a fun challenge.

Discussion: Students valued the course and identified that they had gained coding skills and an understanding of their potential use. They saw its use for themselves personally (for example, developing a health app). They also saw the potential for healthcare delivery and research if more healthcare professionals understood the language of coding and could collaborate effectively with professional coders. Students identified that learning about coding was different from digital literacy.

Conclusion: Students considered that coding skills teaching should be offered as an optional part of the medical curriculum.

Take Home Messages: Students are open to and value coding opportunities in medical school.

#7J3 (135269)

Practical MRI sessions: The road to an in-house facility in the technical medical education program

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Background: Magnetic resonance imaging (MRI) is an important diagnostic tool in clinical practice that exhibits many technical complexities. Technical medicine students are trained in both understanding clinical outcomes of MRI, as well as its technical principles, possibilities, and limitations. We report how an in-house MRI facility is deployed to teach students both technical and medical aspects of MRI.

Summary of Work: An in-house MRI facility was specifically designed for educational purposes. Practical assignment questions were adapted to the capabilities of the MRI system. The introductory lecture, preparation materials, practical instructions and questions, and practical supervision were evaluated by all participating students.

Summary of Results: 43 first-year technical medicine master students were the first to undergo the in-house 4-hour during practical sessions. They were (clinically) trained in patient safety and interaction, and (technically) in recognizing and understanding MRI-related artifacts and sequences. Students were highly satisfied with instructions and supervision during the practical session in this set-up, only a small remark was made on the clarity of the preparation materials and assignment questions.

Discussion: The main advantage of this set-up is the cost-effective aspect of owning a low-cost MRI system while having a learning experience equal to a hospital setting. Furthermore, this creates the opportunity to supervise multiple groups at once by one supervisor.

Conclusion: The opportunity of conducting in-house practical sessions with students has shown great promise. Preparation instructions and assignment questions should be improved to maximize learning experience and to conduct practical sessions more efficient.

Take Home Messages: We have taken the first step towards a cost-effective and fully integrated setting in which one supervisor can ideally guide multiple groups of technical medicine students. Additionally, students do not need to be proficient in patient interaction for this training, which would be required before working with clinical patients in more complex environments like hospitals.

#7J4 (132488)

Promoting ultrasound in undergraduate medical education: an exploration of truth statements and a critical narrative review

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Background: There are increasing calls for early integration of ultrasound into medical education, beginning in medical school. However, the evidence base underpinning these calls has not been sufficiently examined. In this study we identified the 'truth statements' (discursive rationales) that support the move towards incorporation of ultrasound in undergraduate medical education, and examined the evidence base for these truth statements.

Summary of Work: We systematically identified 68 medical education publications containing statements calling for early ultrasound training. We used Foucauldian critical discourse analysis techniques to identify frequently occurring 'truth statements'. We then conducted a critical narrative review to identify supporting evidence that supported these statements.

Summary of Results: We identified four dominant 'truth statements': Undergraduate ultrasound training (1) ensures a minimum skill level for patient safety; (2) is necessary because graduates must acquire advanced skills during post-graduate training; (3) improves medical students' diagnostic accuracy and ability to learn physical examination techniques; (4) allows students to see inside a living body, leading to better understanding of anatomy. Despite a systematic search, we found minimal empirical supporting evidence for any of these 'truth statements'.

Discussion: We approached this topic from a critical theoretical perspective, and then examined each truth claim within its authors' research paradigms. Our analysis highlights the constructed nature of the discourse promoting early integration of ultrasound in medical education.

Conclusion: Early integration of ultrasound in medical education is seen by authors within the field as natural, inevitable, and positive. We have, however, found minimal evidence to support the claims legitimizing this move.

Take Home Messages: The push for ultrasound training in undergraduate medical education is rationalized through a set of 'truth statements' that appear in academic publications, creating a sense of legitimacy and consensus. The lack of empirical evidence for these 'truth statements' demonstrates that factors other than research evidence play in propelling curricular change.

#7J5 (135539)

Seeing is believing: Simulation-based ultrasound imaging in (under)graduate technical medical education

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Background: Ultrasound is a relatively inexpensive technology that can easily be applied in clinical practice to optimize diagnostic and therapeutic procedures. Efficient use of ultrasound not only requires basic skills practice but also an understanding of the underlying technological principles of ultrasound and in-depth anatomical knowledge. We report the design of a Dutch ultrasound curriculum extending from undergraduate to graduate technical medical education.

Summary of Work: The necessary knowledge and skills were determined by a learning needs assessment. In the undergraduate years, basic theoretical and technical knowledge is offered and students practice live scanning and device handling on phantoms and standard simulators. This allows students to experience ultrasound scanning without the complexity of the human anatomy. A variety of clinical cases supports anatomical diversity and transfer of learned skills. In the first graduate year, advanced theoretical knowledge is complemented with simulator training and hands-on scanning on fellow-students. Only in the final two graduate years, students practice scanning on patients.

Summary of Results: Ultrasound knowledge and skill is integrated and assessed across the curriculum. Students learn to apply basic knowledge and practice ultrasound scanning in a safe and controlled environment before practicing on actual patients.

Unstructured evaluations by clinical rotation supervisors show that students have an adequate understanding of and skills in ultrasound scanning.

Discussion: We experienced that combining theory about technological principles with hands-on practice results in superior ultrasound skills than teaching anatomy and hands-on practice alone.

Conclusion: We currently perform a study to investigate the acquisition and application of ultrasound knowledge and skills to validate the design of the curriculum.

Take Home Messages: Integration of ultrasound knowledge and skills in a (under)graduate curriculum is feasible. Students have to show proficiency in ultrasound knowledge and skills before actual practice on patients.

#7J6 (133877)

Enhancing 1st year success in anatomy and physiology for physiotherapy and occupational therapy students

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Background: Students in physiotherapy and occupational therapy are taught anatomy and physiology in 1st year as an important underpinning of their future professions. Within anatomy and physiology students are expected to consume a vast amount of knowledge. At 1st year level we assume that students have the prerequisite foundation knowledge developed in school to build upon.

Summary of Work: Given the variation in the South African schooling system we challenge this assumption as a number of students struggle to grasp important concepts within anatomy and physiology. Therefore we are attempting to identify students who are at risk of failing the course and/or enter an extended degree programme. We therefore explored the link between tertiary level Anatomy / Physiology and Grade 12 high school mathematics/Life science.

Summary of Results: A Fisher-exact was used to test for association between a performance of <60% in Mathematics & Life science vs performance in Anatomy / Physiology. In 2012 and 2014 with n=113 respectively, an association between mathematics and anatomy/ physiology marks with $p \leq 0.001$, and life sciences with $p \geq 0.005$ were found. The 2013 cohort (n=123) was the only year where life sciences had an association with anatomy and physiology with $p \leq 0.007$.

Discussion: In all classes analysed we obtained evidence of a strong association between low performances in grade 12 mathematics and a low performance in both Anatomy and Physiology. Surprisingly the association with life sciences which includes human and plant biology were limited.

Conclusion: Taken together, we propose that mathematics provides the required analytical, abstract thinking and problem solving skills needed for the understanding of anatomy and physiology.

Take Home Messages: The association between mathematics versus anatomy and physiology needs to be further explored. Further attention needs to be given to the school curriculum of life sciences which is thought to form the basis for anatomy and physiology content at tertiary level.

#7J7 (131079)

3D Anatomy Models and Impact on Learning: A Review of the Quality of the Literature

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Background: The aims of this review were to identify studies exploring three-dimensional (3D) anatomy models and their impact on learning, and to assess the quality of research in this area.

Summary of Work: PubMed, EMBASE, and the Web of Knowledge databases were searched using the following keywords "3D anatomy", "three dimensional anatomy," "3D virtual reality anatomy," "3D VR anatomy," "3D anatomy model, "3D anatomy teaching", and "anatomy learning VR". The search words were also used in searching eight medical and dental education journals and seven anatomy journals. Three evaluators independently assessed the quality of research by using the Medical Education Research Study Quality Instrument (MERSQI) for quantitative studies.

Summary of Results: Of the 94,616 studies identified initially, 30 studies reported data on the impact of using 3D anatomy models on learning. The majority of studies were of moderate quality according to MERSQI scoring. The mean score was 10.26 (SD 2.14, range 6.0 to 13.5). The rater intra-class correlation coefficient (ICC) for total MERSQI score was 0.79 (95% confidence interval 0.75-0.88).

Discussion: Most studies were from North America and Europe and mainly from medical and dental schools. However, most studies did not provide strong evidence and were having gaps in their design and hence reported results.

Conclusion: The literature provided a variety of 3D anatomy models used in teaching. There was no solid evidence that the use of 3D models is superior to traditional teaching. However, the studies varied in the quality of research.

Take Home Messages: More studies are needed to examine the short and long impacts of 3D models on learning using more valid and appropriate tools to assess learning impact and visual-spatial ability.