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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.

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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 therefor 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.