

Introduction: Worldwide there is a large increase in the application of ultrasound (US) in both medical research and diagnostics. The application and interpretation of ultrasound differs from the other imaging modalities (CT, MR), since ultrasound is a dynamic imaging modality; the user controls both the field of view and the settings of the view. This requires not only image interpretation skills, but also psychomotor skills which can be trained with simulation. At the Experimental Center for Technical Medicine in the Netherlands we designed a hands-on course during which simulator training and real scanning are combined.

Objective: The aim of this course is to enable all participants to independently perform a structured ultrasound examination on the human body by understanding and application of ultrasound principals, with specific simulation and real scanning training.

Method: Each course day has specific learning goals. During the first day theoretical background information in physics is combined with practicing the understanding of image composition and plane perception by a simulator (*Simbionix Ultrasound simulator (U/S MentorTM), Module Sonography Basic skills – Task 1, “Basic hand-eye coordination”*). Each participant is given nine objects to visualize in the correct plane (three objects in three different views). After completion, feedback is given by a percentage of accuracy. After simulated training on plane perception, the participants will be trained ‘hands-on’, in couples on a real Ultrasound device (*Siemens- Acuson S1000*) to translate what has been learned on a simulator to clinical practice. The abdominal ultrasound examination is used to put the theory into practice.

The second day focusses on performing a structured exam, executed with real scanning. The simulated training is used to train the course participants on the use of knobs (‘knobology’) and their effect on image quality (*Simbionix Ultrasound simulator (U/S MentorTM), Module Sonography Basic skills – Task 3, “Knobology”*). Participants are asked to obtain the best corresponding view to the given example, and obtain feedback afterwards. Group summaries of ‘wrongly not used’ and knobs that are ‘wrongly used too much’ were obtained after each training session to compare results.

Results: A trial version of the course has been executed. Oral feedback by the participants indicated an experienced improvement in plane perception. The knobology training on the simulator improved their skills to regain an optimal image quality on the real US-device. This skill was tested by course instructors changing the image settings and participants’ attempts to regain proper image quality, with good result. Both outcomes were determined via face-to-face meetings.

Conclusion: Initial results demonstrate that incorporating the ultrasound simulator into the hands-on course in ultrasound imaging for medical professionals is of added value. Further research and more sessions are needed to determine the effect of a combined simulator and hands-on real scanning course.