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Grant ID:



# College of Radiographers Industrial Partnership Research Awards Final Report Form

Please use the tab key to move to next question

<b>1. Principal Investigator</b>	Cathy Williams
<b>2. Project Title</b>	Can simulation training replace initial clinical teaching for doctors learning transvaginal ultrasound?
<b>3. Amount of Award</b>	£2403.95
<b>4. Did you spend the money as indicated in your proposal (if not why)?</b>	
Yes	
<b>5. Did you reach your intended project outcomes (if not why)?</b>	
Yes	
<b>6. What are your significant findings?</b>	

**1. Primary Research Question: Does the transvaginal ultrasound simulator provide novice scanners with the ability to adequately examine all of the required anatomy and correctly distinguish between normal and abnormal appearances (when compared with standard clinical training)?**

The simulator group outperformed the clinical training group both for overall score (by 8%) in the post-test assessment and in each of the five components which comprised it (by 3-21%). These results were not statistically significant and therefore imply that simulation training could replace initial clinical training as equivalent transvaginal ultrasound abilities were demonstrated. However, comparison of the average scores of the two groups indicates that the simulator group were actually better able to adequately examine the anatomy and correctly distinguish between normal and abnormal appearances. Therefore there was simply insufficient evidence to allow the null hypothesis to be rejected.

Explanations for the quantitative results from the qualitative data were that training on the simulator:

- Is more time efficient.
- Results in faster skill acquisition.
- Increases a trainee's confidence.
- Teaches normal anatomical appearances first
- Allows trainees to practise small parts of the scan individually, without time restrictions.
- Instils good technique due to systematic and repetitive approach to learning.

Participants unanimously thought that the simulator should be incorporated into transvaginal ultrasound curriculum with eight out of nine opting to begin their practical training using it. This adds further weight to the conclusion that simulation training could replace initial clinical training for basic transvaginal skills.

**2. Secondary Research Question: Does the transvaginal ultrasound simulator allow novice scanners to gain sufficient experience to ensure confidence in ability to progress to standard clinical scanning on real patients?**

Training on the simulator was found to affect a trainee's confidence to progress to clinical scanning. The majority of participants indicated practice on the simulator can increase a trainee's confidence level prior to attempting a transvaginal scan on a real patient, a finding which has clinical significance regarding the patient's experience. Reasons given as to how and why the simulator builds confidence were:

- It enables trainees to become familiar with the routine of the scan, the controls and how to recognise and examine basic anatomy.
- The 3D anatomy feature enables trainees to understand the relationship between the probe, the anatomy and the images produced.
- Learning can occur through making mistakes without consequences.
- It reduces pressure on the trainee as there is no patient present.
- Teaches normal anatomical appearances first.
- Allows trainees to practice small parts of the scan individually, without time restrictions.

Although it was beyond the realms of this project to ascertain whether the increased performance of the simulator group in the post-test assessment equated with increased performance in clinical training, participants felt as the simulator decreases a trainee's anxiety and increases their confidence they are likely to perform better when faced with a real patient. In essence, it helps to prepare them for the progression to clinical training with the potentially clinically significant outcome of improving the patient's experience of having their scan performed by a trainee. In fact, use of the simulator was unanimously thought to be able to improve the patients experience through increasing patient comfort, better probe handling and a reduction in the duration the probe is inserted for.

**7. Have you submitted the work for publication (if so where)?**

Yes article has been submitted to Ultrasound and an oral presentation was given at BMUS 2012.

**8. Please provide an executive summary of your work (two sides of A4 maximum)**

**N.B. If you already have a draft or final version of the proposed publication can you please attach.**

Please also see attached draft of article submitted to Ultrasound, full MSc thesis and slides used in presentation at BMUS.

## **BACKGROUND**

The ScanTrainer transvaginal ultrasound simulator has been developed to facilitate initial training of transvaginal ultrasound skills without patient contact. Due to the intimate nature of the examination and in some cases, limited training opportunities, the need for simulation based-education in ultrasound has gained momentum. Currently, research into the effectiveness of the ScanTrainer is limited.

## **PURPOSE**

To compare conventional TVUS training with the ScanTrainer for development of basic clinical skills and confidence.

## **METHODOLOGY**

A mixed method study was conducted in a single institution between October 2011 and January 2012. Participants were recruited using convenience sampling and allocated to the control (clinical training) or experimental (simulation training) group following a pre-test. After 10 hours of their allocated TVUS training method a post-test assessment was conducted and the results statistically analysed. Participants then experienced the alternative method of training and completed questionnaires. The results were used to inform semi-structured interviews for each group. Interview transcripts were interpreted using theme analysis.

## **RESULTS**

A small number of doctors completed the study, 9 (82%) out of the 11 recruited. Average scores showed that the simulation training group outperformed the clinical training group on overall score and each of the five post-test components. No statistically significant differences were demonstrated for overall score ( $u=13$ ,  $p=0.556$ ) or the five components ( $p=0.063 - 1.000$ ). The majority of participants (89%) felt that practice on the ScanTrainer can increase confidence prior to attempting a real TVUS.

## **CONCLUSIONS**

TVUS training on the ScanTrainer has the potential to replace initial clinical training, however further larger trials are required to evaluate. Clinically significant outcomes exist if the ScanTrainer training is proven to be more effective than initial clinical training. The ScanTrainer prepares a trainee and builds confidence to progress to clinical scanning, which has the potential to improve the patient experience.

## **LIMITATIONS**

As a result of the quasi-experimental study design establishing causal relationships from the data collected was not possible. However the inferences made from the results (though limited due to a small sample size and subsequent lack of power) have been used to inform and develop recommendations for future research, thus fulfilling this projects role as a pilot study.

## **RECOMMENDATIONS**

1. Repeat trials incorporating multiple centres in order to gain a larger sample size or if not possible repeat smaller trials with effect sizes calculated and compared to those obtained in this study. If results consistently indicate the potentially clinically significant difference noted between the two groups in this study then further research on the predictive validity of the ScanTrainer and its effect on the learning curve is warranted.
2. Construct, content and face validity need to be investigated and demonstrated for the ScanTrainer.
3. Research assessing skill retention after training on the ScanTrainer.
4. A comparison of independent and proctored approaches to learning on the ScanTrainer.
5. Development of studies which are able to assess the effect on patient outcomes of prior training on the ScanTrainer.
6. Research on the effectiveness of the ScanTrainer as part of a hybrid simulation tool.
7. Replica trials for the early pregnancy modules on the TVUS ScanTrainer and the transabdominal application when it is released
8. Variations on the current trial to further determine the role, length and breadth of VR TVUS training using the ScanTrainer as part of a curriculum.
9. Research focused on developing standardised methods of evaluation for new medical simulators.

**9. Return of application form**

Please return this form to:

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