



THE ROYAL
COLLEGE OF
SURGEONS
OF EDINBURGH

The Faculty of Surgical Trainers



FST/ASME Educational Research Grant Report 2016 - 17

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FST/ASME Educational Research Grant Report 2017-18

RESEARCH GRANT RECIPIENT

Sotiris Papaspyros

DEPARTMENT

Cardiothoracic Surgery Royal Infirmary Edinburgh

PROJECT TITLE

Reliability of low fidelity simulation models in acquisition of basic surgical skills. The role of deliberate practice.

SUMMARY

Background:

Surgical training has evolved to conform with several limitations: shorter work-week for residents, increasing complexity of cases, emphasis on operating room efficiency and mitigation of medical errors.

Acquisition of basic surgical skills can take place outside the operating room on low-fidelity, readily available simulation materials (bananas, potatoes, poached eggs).

Deliberate practice can provide the educational framework to achieve competence in surgical tasks (needle rotation, economy of movement, pace).

Methods:

Over a period of nine months, we recruited thirty junior doctors and medical students with minimal or no previous exposure to surgery.

We purchased an ironing board (operating table), needle holders, sutures and bananas. On a one-to-one basis we explained to each participant the concept of deliberate practice. We video recorded and scored their attempts before and after six days of at-home practice.

Results:

There was significant improvement in all parameters measured flow/rhythm, precision, rotation and time/pace. Twenty-eight participants improved their skills in all categories and were able to perform the task faster and with minimal hesitation, deviation, interruption or repetition.

Conclusion:

In our opinion this project provides compelling evidence that basic surgical skills can reliably be taught and learned using low fidelity models and deliberate practice.

RESEARCH GRANT REPORT

A) Clinical and Scientific Significance of Advances Made

This project has enhanced our knowledge and practice in surgical education and training both from trainee and trainer perspectives.

Our work provides evidence on how low-fidelity simulation models can reliably be used to achieve significant progress through early stages of the learning curve. Furthermore, it demonstrates the principles that need to be observed in order for deliberate practice to be effective and efficient in acquisition of surgical skills.

Accurate assessment of an individual's abilities at an early stage may be critical in their choice of career and whether they have a realistic chance of becoming an expert through deliberate practice.

The next step in this project is to identify the software that will support video-based motion analysis in order to objectively quantify the measured parameters. Our aim is to provide insight into how assessment methods can be optimized in terms of validity, reproducibility and cost-efficiency.

B) Problems Encountered and Steps Taken to Overcome Them

We used video to record and score each participant. This was done on a visual scale and was open to observer bias for the three qualitative parameters measured. We were not able to identify the software required in order to establish an objective motion analysis method. We contacted the authors of 'Glarner, C.E., Hu, Y.Y., Chen, C.H., Radwin, R.G., Zhao, O., Craven, M.W. et al, Quantifying technical skills during open operations using video-based motion analysis. *Surgery*. 2014;156:729-734.'

C) Collaborations Established

D) Publications and Presentations

- Presentation: FST Conference Birmingham 2017
- Book chapter: Recent Advances in Surgery (RAS) Title: Acquisition of Surgical Skills - from novice to master; a fresh perspective
- Publication (submitted): Diastolic learning: Making the tacit, explicit. The role of low fidelity simulation models and deliberate practice in acquisition of basic surgical skills.

E) Acknowledgments

This work was supported by the Faculty of Surgical Trainers and Association for the Study of Medical Education with a research grant.



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