

## **The development and validation of a low-cost trans perineal (TP) prostate biopsy simulator from 3Dprinted mould: improving trainees' confidence and cognitive targeting skills**

Ong K.O <sup>1&2</sup>, Thapa G.T <sup>2</sup>, Webb W.R <sup>2</sup>, Rahman E.R <sup>2</sup>, Dryhurst D.D <sup>1</sup>, Lunawat R.L <sup>1</sup>, Sriprasad S.S <sup>2</sup>

<sup>1</sup> Princess Royal University Hospital (NHS Kings College Foundation Trust), Department of Urology, London, United Kingdom,

<sup>2</sup> Canterbury Christ Church University, Institute of Medical Sciences, Faculty of Medicine, Health, and Social Care, Kent, United Kingdom

### **Introduction & Objectives**

To develop a simulation modality for trans perineal (TP) prostate biopsy that can be utilised in training. The aim of this study is to create a novel and low-cost model that has face, content and construct validity and high educational value.

### **Materials & Methods**

This research developed a TP prostate biopsy simulation model using 3D-printed moulds and utilisation of tissue mimicking materials. Important regions including the anterior, mid and posterior zones were coded with different colours. Ultrasound - visible abnormal lesions were embedded in the prostate phantom. Expert, amateurs and biopsy- naïve participants in TP prostate biopsies were prospectively recruited. Skills that were deemed essential for TP prostate biopsy were identified through the consensus of six experts (>125 independent cases each). These skills were incorporated into tasks that were subsequently used to rate the performances of the participants. This included accuracy and timing of both systematic and target biopsies. Immediate feedback can be obtained based on the colour of biopsy cores taken. A survey was distributed after usage of simulator to evaluate its realism and educational value.

### **Results**

This research developed a low cost (<£7) TP prostate biopsy bench model simulator for training and education using 3D- printed moulds. We were able to prove face, content and construct validity in this simulator. There was a significant difference ( $p= 0.02$ ) in the accuracy of systematic 12-core ultrasound-guided biopsies between expert and novice groups. There is also significant difference ( $p=0.01$ ) in the ability of expert group to accurately identify the target lesion on ultrasound. Participants rated the overall realism of the simulator as 4.57 out of 5 (range 3 – 5). 100% of the experts felt that there is benefit in introducing this simulator in TP prostate biopsy training. 85.7% of the participants strongly agree that the simulator improved their confidence in performing this procedure.

### **Conclusions**

There is value in integrating this proof-of-concept TP prostate biopsy simulator into training. Its low cost makes its introduction feasible. It has highly rated educational value and was shown to have face, content, and construct validity. There is potential in improving patient safety and diagnostic accuracy with this simulator.