Background

- Simulator training allows physicians to learn, practice and refine practical procedures without exposing patients to potential complications during the learning curve.
- Allows for high intensity training without the restrictions of patient throughput.
- Electrophysiology is a technically and intellectually complex specialty incorporating procedures with the potential for significant morbidity and mortality.
- Fundamental skills in electrophysiology involve catheter manipulation within the body guided by imaging displayed on two dimensional screens.
- We sought to evaluate an electrophysiological catheter manipulation simulator, the ANGIO Mentor (Simbionix, Cleveland, OH, USA).
- Our aim was to validate the simulator in terms of its similarity to real life by correlating operator performance on the simulator with real life procedural experience.

ANGIO mentor simulator

Methods

- 21 subjects from 9 different centres participated in the study.
- Data was collected using simulators in 2 European sites.
- Participants’ EP experience was graded from 1-4.

<table>
<thead>
<tr>
<th>EP Grade</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Expert&gt;5 years</td>
</tr>
<tr>
<td>2</td>
<td>&gt;2 years experience</td>
</tr>
<tr>
<td>3</td>
<td>1-2 years experience</td>
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<tr>
<td>4</td>
<td>Novice &lt;1 year experience</td>
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- The simulator comprises a catheter handle (uni or bidirectional) and shaft fed into a port on the device, with catheter manipulation simulated on screen.
- Haptic feedback is delivered through the shaft.

The simulation comprises 5 basic EP modules:

- Simple 3-dimensional shape model
- Complex 3-dimensional shape model
- Beating 3-dimensional cardiac shell
- 2 fluoroscopic models

- The fluoroscopic views are displayed by activating fluoroscopy pedals.
- Biplane imaging is available in all the modules and was used for the evaluation.
- In each module, the aim is to reach targets within the model and maintain a stable catheter tip position at those targets.
- In the latter 3 modules targets are anatomical sites, such as the right ventricular apex and left inferior pulmonary vein.
- Successful attainment of targets within a time limit is additive to a score for each attempt.
- Each participant completed the 5 simulator modules 3 times at the same sitting with scores recorded for each attempt.

Results

- Other than for grade 4, the scores between levels were generally not significantly different.

Conclusions

- Performance was better with greater EP experience in all the modules other than module 5 which was not discriminatory.
- In all of the modules, other than module 5, there was a significant difference between the scores between grade 4 subjects and those of the other grades (p<0.05).
- Other than for grade 4, the scores between levels were generally not significantly different.

These results suggest that the simulator provides a reasonable simulation of catheter manipulation, though the modules in general and especially the fluoroscopy ones need further refinement to improve this.
- Currently at St Bartholomew’s Hospital, novice EP fellows need to attain minimal grade 3 scores (equivalent to those who have completed 1 year of EP training) prior to being allowed to perform procedures on patients.
- The simulator at St Bartholomew’s Hospital is open to trainees from all centers.

Conflicts of interest - None