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Virtual Reality Simulator For Knee Arthroplasty: Evaluating Content And Face Validity For Orthopaedic Residency Training

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Disclosures

- No Disclosures or conflict of interests

Background

- Ageing population and increasing demand for lower limb arthroplasty[1]
- Increasing constraints on surgical training[2]
- A need to address the steep learning curve of orthopaedic training[3]

Simulation

- Simulation is used in aviation and military to accelerate learning curves[3]
- Help trainees prepare for theatre[4,5]
- Virtual reality simulators are common for arthroscopic / laparoscopic skills[4]

Virtual reality. (n.d.). JnJInstitute. https://jnjinstitute.com/en-us/virtual-reality

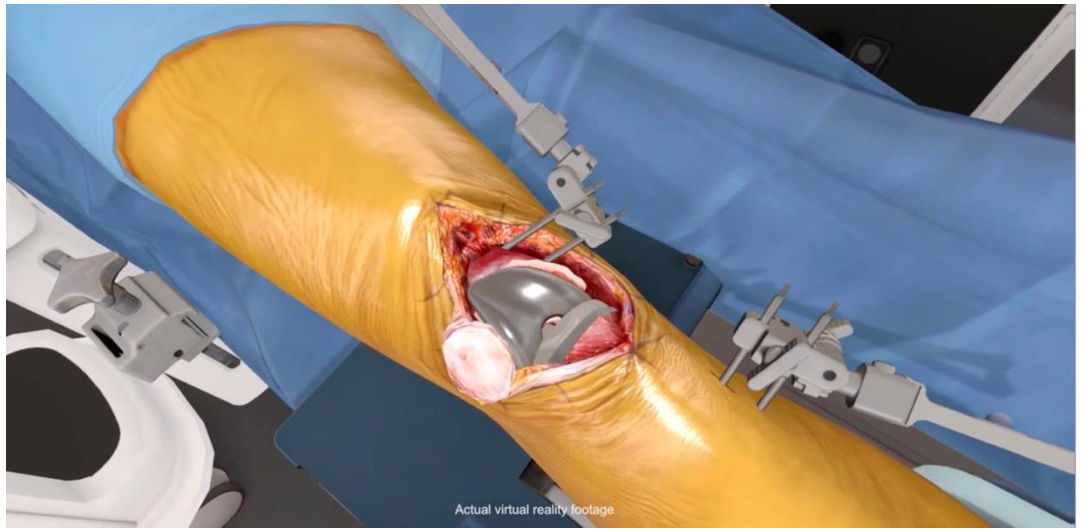
Aims

- Identify content and face validity of the DePuy VR headset for Knee arthroplasty

- What is the perceived use of simulation in Surgical Training

Methods

- 30 participants split into groups: Experienced (8) and inexperienced (22)
- Participants were shown how to use the VR headset and OSSO VR software for DePuy Attune Total knee Arthroplasty
- After a test run completed questionnaire assessing Face and Content Validity.



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Questionnaires

Face Validity

1. Is the visual experience of the theatre realistic?

Strongly Disagree ☐ Disagree ☐ Neither Disagree or agree ☐ Agree ☐ Strongly Agree ☐

2. Is the anatomy demonstrated in the simulation representative of that in TKR?

Strongly Disagree ☐ Disagree ☐ Neither Disagree or agree ☐ Agree ☐ Strongly Agree ☐

3. Is the visual appearance of the instruments realistic of instruments in TKR?

Strongly Disagree ☐ Disagree ☐ Neither Disagree or agree ☐ Agree ☐ Strongly Agree ☐

4. Is the movement of the instruments realistic?

Strongly Disagree ☐ Disagree ☐ Neither Disagree or agree ☐ Agree ☐ Strongly Agree ☐

5. Is the haptic feedback of instrumentation the bone realistic (drilling /sawing)?

Strongly Disagree ☐ Disagree ☐ Neither Disagree or agree ☐ Agree ☐ Strongly Agree ☐

Content Validity

1. Do the procedural steps during the simulation accurately reflect the procedural steps during TKR?

Strongly Disagree ☐ Disagree ☐ Neither Disagree or agree ☐ Agree ☐ Strongly Agree ☐

2. Is the placement of the cutting jigs realistic?

Strongly Disagree ☐ Disagree ☐ Neither Disagree or agree ☐ Agree ☐ Strongly Agree ☐

3. Does the cutting task accurately reflect cutting the distal femur during TKR?

Strongly Disagree ☐ Disagree ☐ Neither Disagree or agree ☐ Agree ☐ Strongly Agree ☐

4. Does the sizing of the component accurately reflect the real sizing during TKR?

Strongly Disagree ☐ Disagree ☐ Neither Disagree or agree ☐ Agree ☐ Strongly Agree ☐

5. Does the simulator reflect the procedure of a real TKR?

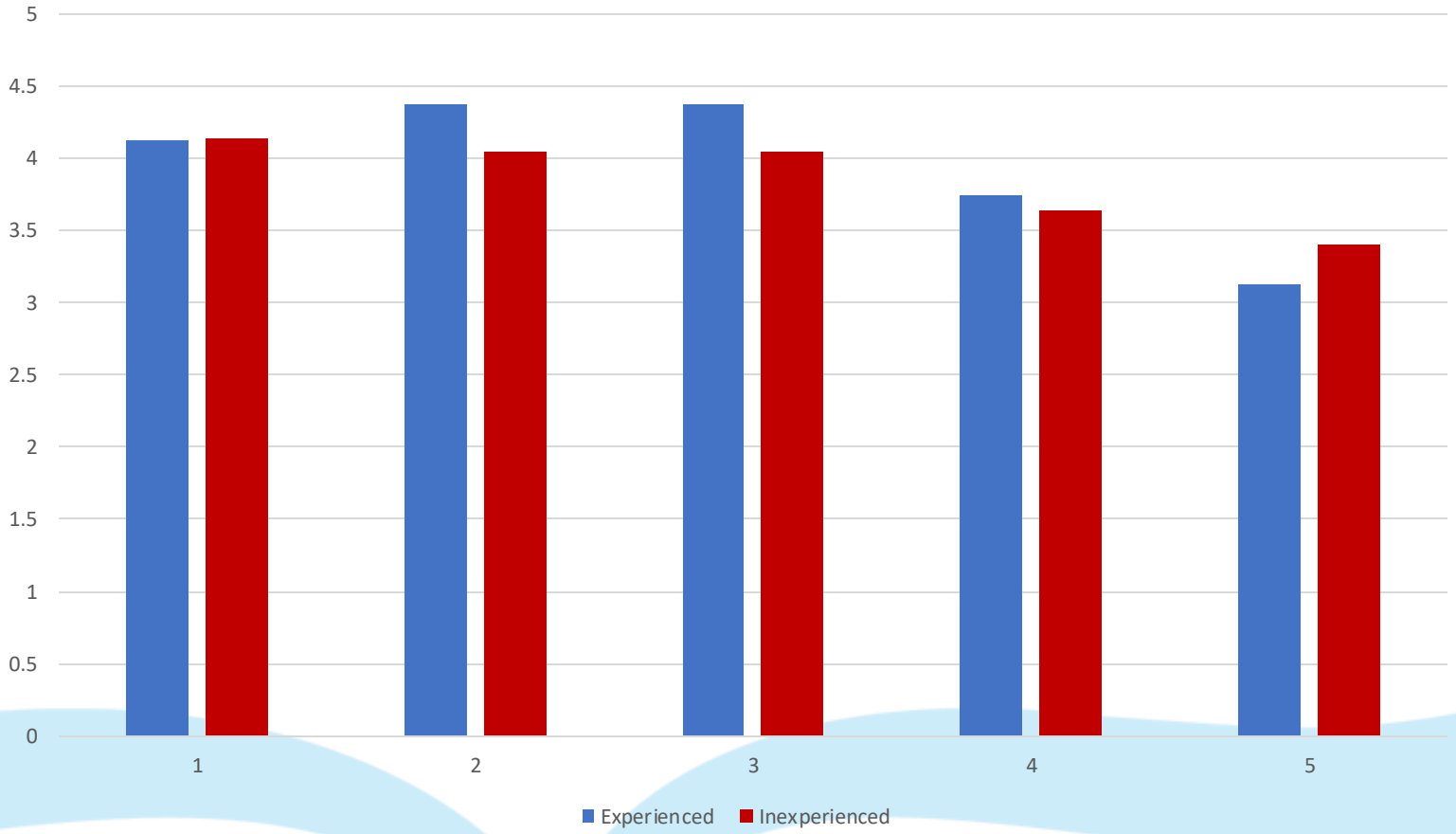
Strongly Disagree ☐ Disagree ☐ Neither Disagree or agree ☐ Agree ☐ Strongly Agree ☐

Results

- *Face validity – Extent to which the simulator appears like a real TKA*

Experienced (N=8)
Average 3.95/5

Inexperienced (N=22)
Average 3.85/5

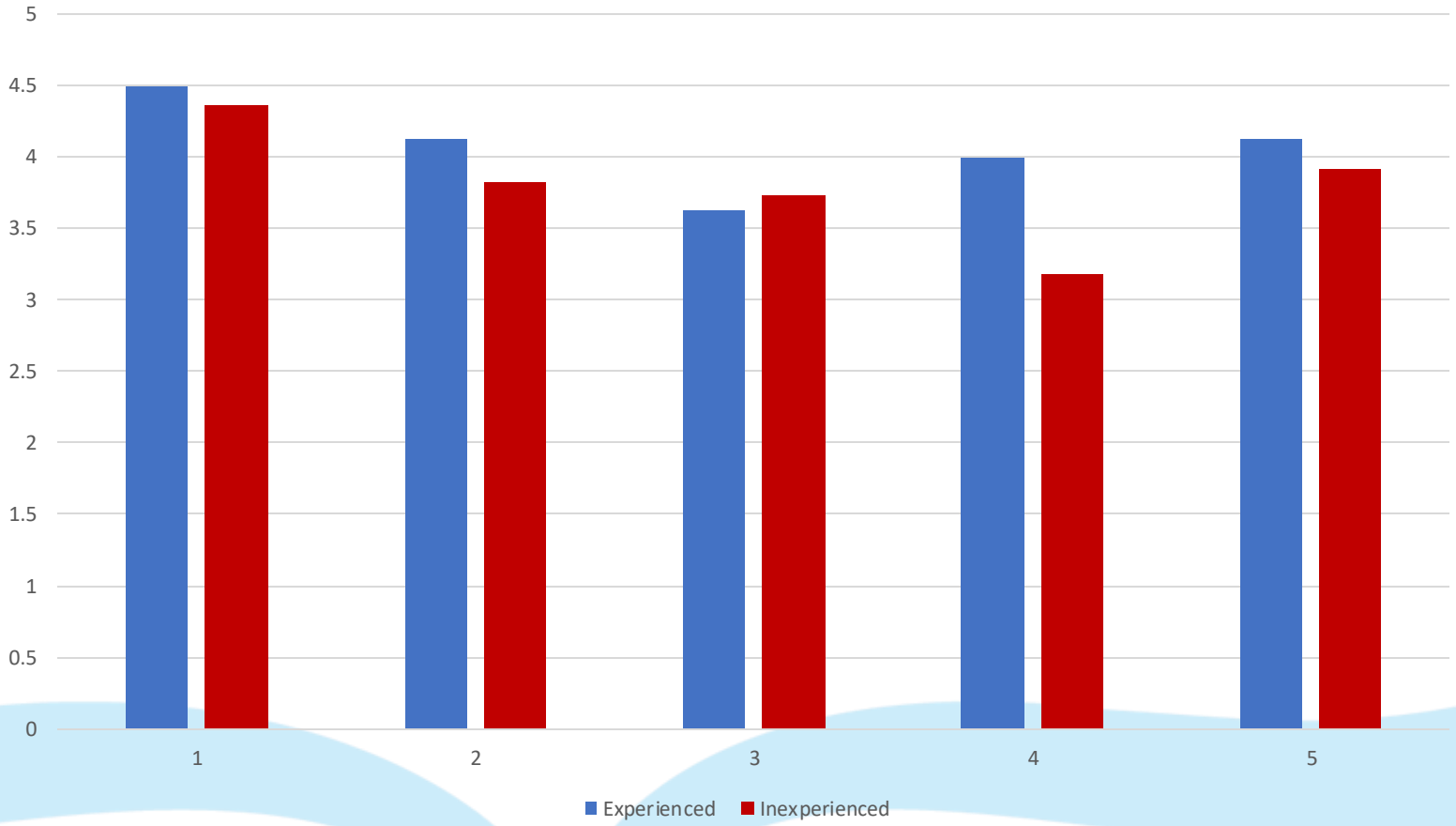


Results

- *Content validity - extent to which the simulator replicates the steps of TKA*

Experienced (N=8)
Average 4.08/5

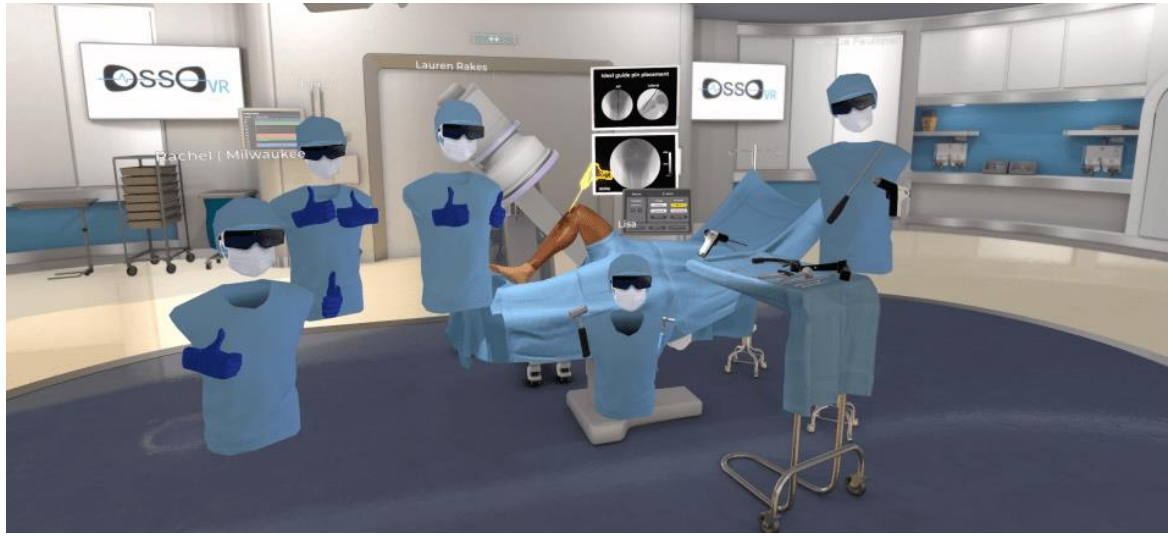
Inexperienced (N=22)
Average 3.8/5



Conclusion

- Simulation training was well received by both experienced and inexperienced Orthopaedic Surgeons

- Strongly positive responses indicates the simulator has content and face validity for its use in surgical training for TKA



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