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Is learning together in virtual reality better than learning individually for surgical teams training for complex operations?

Submission date
23/08/2022

Recruitment status
No longer recruiting

Registration date
24/08/2022

Overall study status
Completed

Last Edited
29/12/2023

Condition category
Surgery

[_] Prospectively registered
[_] Protocol
[_] Statistical analysis plan
[X] Results
[_] Individual participant data

Plain English summary of protocol

Background and study aims
There is good evidence that effective teamwork in surgery is linked to fewer surgical errors and better patient outcomes. Virtual reality is excellent way to train surgeons and scrub nurses individually, however could also be used to train them together in a team. This study aims to use an innovative multiplayer virtual reality training platform to test whether the training together approach is better than learning separately for novices learning a complex open operation. This complex open operation is performing a hip replacement, accessing it from the front of the hip rather than the more usual approach from the back.

Who can participate?
Junior surgeons with less than 5 years experience for the surgeon role, student nurses, medical students and newly qualified scrub nurses with less than 1 year experience for the scrub nurse role. They must have no experience with performing hip replacements coming in from the front of the hip

What does the study involve?
Participants will be randomised to learning in a team or individually. They will all undergo 5 sessions of immersive virtual reality training. In this training they will enter a virtual operating theatre and will be guided on performing their role within the operation (surgeon or scrub nurse). The only difference will be that those assigned to the team group will do the training together live in pairs, whereas the individually trained group will learn separately with a computer avatar playing the alternative role. Otherwise training will be identical. Following the 5th session they will all undergo a real world assessment. Teams will perform this together in their training teams, individual participants will be randomly paired up with a member of the alternative role. The assessment will take place in a simulated operating theatre, with real equipment and on an anatomical model. They will be asked to perform the operation as they learned in virtual reality. They will be marked on their team work, technical performance by blinded expert assessors.

What are the possible benefits and risks of participating?
This is a non-interventional study and so the risks are very small. Some people get headaches or eye strain from the virtual reality training, and there is a small risk using the sharps/drills/saws in the real world assessment. The benefits are that if this method of training proves beneficial it could be rolled out across health services and may benefit patients in the long term

Where is the study run from?
MSk Lab at Imperial College London (UK)

When is the study starting and how long will it run for?
March 2021 to October 2022

Who is funding the study?
Johnson and Johnson (UK)

Who is the main contact?
Mr Thomas Edwards, thomas.edwards@imperial.ac.uk

Contact information

Type(s)
Principal investigator

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Additional identifiers

Clinical Trials Information System (CTIS)
Nil known

Integrated Research Application System (IRAS)
237607

ClinicalTrials.gov (NCT)
Nil known

Protocol serial number
IRAS 237607

Study information

Scientific Title
Collaborative training vs individual training in immersive virtual reality: A randomised controlled trial for novices learning complex open surgery

Study objectives
Multiplayer team training in immersive virtual reality will be superior to individual training for novices learning anterior approach total hip replacements

Ethics approval required
Old ethics approval format

Ethics approval(s)
Approved 10/04/2018, Health Research Authority (2 Redman Place, Stratford, London, E20 1JQ, UK; +44 207 104 8000; contact@hra.nhs.uk), ref: 18/HRA/2085

Study design
Randomized controlled trial

Primary study design
Interventional

Study type(s)
Other

Health condition(s) or problem(s) studied
Educational study examining learning complex surgery in virtual reality

Interventions
At enrolment in the study, the following baseline data is collected: Baseline knowledge assessed using a written assessment developed through expert consensus, baseline demographics: Age, sex, handedness, video game experience, virtual reality experience, role, experience with anterior approach THR, experience with THRs any approach
Randomisation: Block randomisation in a 1:1 ratio performed by an external trial manager using a computer generated random number sequence, allocation concealed until participants have been enrolled in the study. Participants allocated to one of tow parallel groups:
Team training arm: The invention is learning anterior approach total hip replacement surgery in a multiplayer virtual reality platform. Surgeons and scrub nurses work together to learn how to perform their roles in the operations
Individual training arm: The intervention is learning anterior approach total hip replacement surgery in a more conventional single player mode, where the alternative role is played by a computer avatar. Otherwise the training is identical
Each group goes through 5 virtual reality training sessions over a 6 week period, following the 5th and final session they all undergo a real world, assessment in a simulated operating theatre with real equipment and on a validated model hip.
Final follow up is immediately following the real world assessment at 6 weeks

Intervention Type
Other

Primary outcome(s)
Nontechnical performance in a simulated real world assessment using the NOTSS score (Non-Operative Technical Skills for Surgeons) at baseline and 6 weeks

Key secondary outcome(s))
At baseline and 6 weeks:
1. Nontechnical performance in simulated real world assessment using NOTECHS II Score, SPLINTS Scores. 2. Technical performance in simulated real world assessment, using an expert derived task specific checklist, acetabular component positioning (anteversion and inclinicaton), procedure time.

Completion date
01/10/2022

Eligibility

Key inclusion criteria
Surgeons: training surgeons FY2 - ST4 level, No experience performing supervised total hip replacements via the anterior approach, <10 THAs performed supervised using any approach. No previous orthopaedic or open virtual reality surgical simulation training

Scrub technician: Student nurses, Newly qualified scrub nurses or ODPs with < 1 year experience in orthopaedic surgery, Medical students. No experience scrubbing for anterior approach THR surgery, no specific training in THR instrumentation or technique, No experience of virtual reality surgical simulation

Participant type(s)
Health professional

Healthy volunteers allowed
No

Age group
Adult

Sex
All

Total final enrolment
40

Key exclusion criteria
Surgeons: Performed supervised > 10 THR operations any approach, Performed supervised any anterior approach THA's, previous open or orthopaedic surgical virtual reality simulation training

Scrub nurses: > 1 year orthopaedic scrub nurse experience, specific training in THR instrumentation/ technique, scrubbed for any anterior approach THA operations, previous surgical virtual reality simulation training

Date of first enrolment
01/04/2021

Date of final enrolment
01/10/2022

Locations

Countries of recruitment
United Kingdom

England

Study participating centre
Imperial College London
MSk Lab
2nd Floor, Sir Michael Uren Hub
White City Campus
Imperial College London
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Sponsor information

Organisation
Imperial College London

ROR
https://ror.org/041kmwe10

Funder(s)

Funder type
Industry

Funder Name
Johnson and Johnson

Alternative Name(s)
Johnson & Johnson, Johnson & Johnson Services, Inc., Johnson&Johnson, Johnson & Johnson Private Limited, , , J&J, JNJ

Funding Body Type
Government organisation

Funding Body Subtype
For-profit companies (industry)

Location
United States of America

Results and Publications

Individual participant data (IPD) sharing plan
All data generated or analysed during this study will be included in the subsequent results publication

IPD sharing plan summary
Published as a supplement to the results publication

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article		01/12/2023	29/12/2023	Yes	No
Participant information sheet	Participant information sheet	11/11/2025	11/11/2025	No	Yes