The use of augmented reality and objective metric tracking in hysteroscopy training: a proposed study summary

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Background

The COVID-19 pandemic highlighted significant challenges in maintaining gynaecological surgical training in unusual times and trainees reported a significant reduction in exposure to all aspects of gynaecological surgical training1. However, it would be disingenuous to attribute all the surgical training concerns to COVID-19 as many challenges were already apparent even before the pandemic.

Yearly trainee evaluation form (TEF) surveys from the Royal College of Obstetricians and Gynaecologists (RCOG), prior to 2020, highlighted significant deficiencies in surgical training with trainees stating an inability to meet basic to advanced gynaecological surgical competencies, a lack of access to simulation and very few structured accessible simulation training programmes as key reasons. Furthermore, the RCOG TEF survey in 2019 reported that only 59.4% of trainees reported sufficient opportunity to fulfil gynaecology training requirements, in comparison to 83.4% for obstetrics

One of the key surgical competencies all gynaecologists must master is hysteroscopic surgery and this is particularly pertinent in the era of outpatient hysteroscopy. In the UK, these practical skills are currently developed in the operating theatre and a lack of surgical exposure perhaps due to a focus on service provision to clear ever growing surgical backlogs, and larger competition between trainees to attend theatre sessions, has led to many feeling underconfident and underkilled.

There is a large amount of data in the wider literature highlighting the benefits of simulation training in laparoscopic surgery with clear evidence that simulation improves confidence, hand eye co-ordination and overall dexterity 2,3,4. Unfortunately, there is a lack of data looking at simulation in the hysteroscopic setting. This study proposes to integrate hysteroscopic simulation training into speciality training in the UK to supplement the development and maintenance of hysteroscopic skills and both improve trainer and trainee confidence and ultimately patient outcomes.

Proposed method

To combat the negative impact on laparoscopic surgical training in the Kent, Surrey and Sussex (KSS) deanery a bespoke laparoscopic simulation training programme was developed and implemented in 2022 for all trainees (ST1-7). This programme consisted of theoretical knowledge linked to the RCOG core curriculum, practical sessions to allow trainees to practice and develop skills and the provision to each trainee of a laparoscopic box and training package to allow them to practice and consolidate their skills at home.

Trainees were divided into 3 streams with 20 trainees attending each stream;

- basic (ST1-ST2),
- intermediate (ST3-5)
- advanced (ST6-7)

Each stream had a bespoke curriculum combining theoretical lectures and a mixture of dry and wet lab training sessions. All participants were asked to complete an anonymised questionnaire on laparoscopic knowledge, skills and surgical confidence before their first session and after their final session using a Likert scale of 1-10.

They also performed stratified laparoscopic pass exercises utilising the Inovus LapAR system at the beginning and end of the course.

Trainees were given a simple manipulation and grasping task that was conducted and analysed using four key aspects: time; speed; smoothness and distance travelled.

Across all streams (basic, intermediate and advanced), a statistically significant improvement was noted across objective metrics including time taken to complete the procedure, smoothness and speed. Trainees also rated the course highly, 100% of trainees felt their laparoscopic skills had improved, 95-100% felt their confidence in theatre had improved and 100% would recommend the course to a colleague.

For the 2023 cohort, we proposed adding a much needed hysteroscopic training package to this course and on each of the streams an additional 4th hysteroscopic session was added. Similar to the laparoscopic sessions, the theoretical element was closely developed in line with the RCOG core curriculum (Table 1) and yearly competency sign-offs. These sessions are planned to take place between October to December 2023.

Development of hysteroscopic skills will be assessed using objective metric tracking on the Inovus Hyst AR device. Trainees will also be asked to complete an anonymised questionnaires on self-rated hysteroscopic skills at the beginning and the end of each of the sessions. During the sessions learning will be split between theoretical lectures and hands on dry and wet lab training using hysteroscopic simulation models and the Hyst AR device (Table 2).

Table 1 Theoretical elements and lectures

Basic	Intermediate	Advanced
Anatomy	RCOG best practice	Analgesia and anaesthesia
Basic diagnostic hysteroscopy	Hysteroscopic polyp management	Setting up a service
Consent	Hysteroscopic fibroid management	Transcervical resection theory
Hysteroscopic setup	Novasure endometrial ablation	
Analgesia for hysteroscopy	Complications	
Ambulatory procedures		

Table 2 Practical exercises/simulations

Basic	Intermediate	Advanced
Hysteroscopic setup	Myosure setup	Polyp resection - myosure
Performing a diagnostic hysteroscopy	Polyp resection - myosure	Fibroid resection – myosure
MVA	Fibroid resection – myosure	Septum resection
Word catheter	Fluid management system setup	TCRF/TCRE
Mirena coil insertion	Cervical shock simulation	Bleeding simulation
Pipelle biopsy	Novasure endometrial ablation	

Discussion

It would not be fair to hold the pandemic exclusively responsible for the challenges in gynaecology training. Pre-pandemic, the RCOG training evaluation survey from 2017 to 2019 consistently reported that only 56% to 59.4% of trainees fulfilled their training requirements in gynaecology, highlighting the significant gaps when compared to obstetric training. They reported factors such as inadequate opportunity to fulfil training requirements in gynaecology, poor access to simulators and a lack of a formal programme of gynaecology simulation training as barriers to learning.

Training in hysteroscopy is essential and integral for all gynaecologists, generalists, and specialists alike and not just for those developing a career in advanced minimal access surgery. In the era of outpatient hysteroscopy and treatment, this has perhaps become even more integral. Key operative skills such as the vaginoscopic approach, good tissue handling and sound surgical technique is key to minimising patient discomfort and ultimately improving patient care. Simulation training is also likely to prove key in the training and skill maintenance of all hysteroscopists including nurse specialists and training pathways should be developed to reflect this.

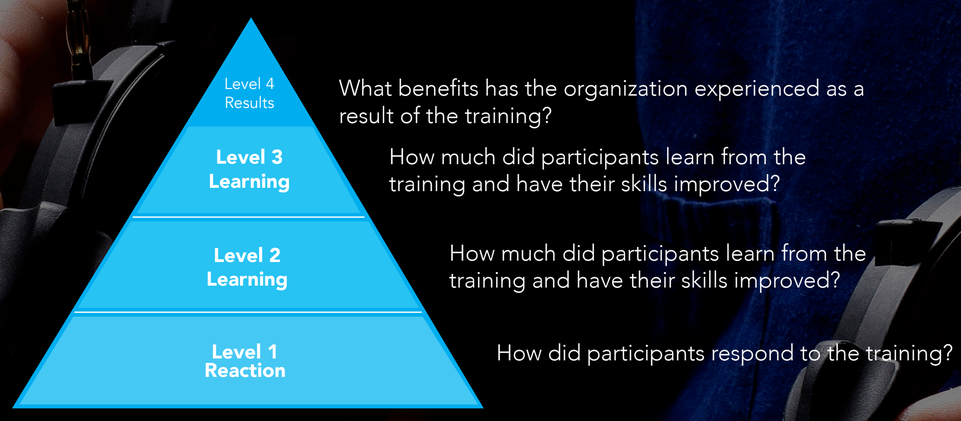

Figure 1. A Kirkpatrick Evaluation Pyramid highlighting outcomes 1,2 &3 satisfied through this study.

In a concurrent study, we collected surveys prior to and after: including demographics, prior experience, and self-confidence scores for key laparoscopic tasks on a 1-10 scale, as well as operative skill data using Inovus AR simulation software. Every area of student's self-confidence improved, with a mean improvement of 3.82 (p=0.03). The more junior the student, the greater their increase in confidence (Mean Pre-FY = 5.23)."

Conclusion

Simulation training is key to developing and maintaining surgical skills and should be imbedded into the RCOG curriculum from ST1 level. The wider evidence already emphasises the benefits of simulation and as highlighted by our laparoscopic data, not only do technical skills objectively improve, trainees also self-report a subjective improvement in their skills, knowledge and confidence. Furthermore, this improved skills, knowledge and confidence appears to allow trainees to capitalise on real time theatre experiences better when they become available and consolidate skills further. With the addition of a hysteroscopic element, this programme will also now embed hysteroscopic simulation training into the curriculum from an ST1 level allowing all trainees to gain access to simulation training, develop safe hysteroscopic skills from an early stage and play a pivotal role in safeguarding training for the future.

References

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