

Surgical Skills Simulation

For the curriculum

Simulation should be essential in the Curriculum.

It should follow on from the initial Microsurgical skills course for all trainees. It should also be considered by all ophthalmologists in order to refresh/keep up to date their skills.

Simulation is not about practical skills only consideration for immersion simulation and simulation for communication skills should be considered.

The wording “must be supported by simulation” will be added to all appropriate Surgical Skills learning outcomes. The ‘year of attainment’ i.e. of initial simulation proficiency will be in line with the year of commencement of the particular surgical skill. For some areas this will depend on the training rotation as exposure to strabismus or glaucoma surgery, for example, will only be available in a particular training slot. The surgical skills below are not the only surgical skills that may be taught, or may benefit from simulation in training, but they cover the specific requirements of the Curriculum.

The use of simulation must not become a barrier for training; simulation may be undertaken in low tech/fidelity settings and is not simply reliant on an EyeSi for cataract or VR surgery. This should be encouraged as essential in training and provision made locally, however there may be situations where trainee and trainer can decide that the trainee can undertake a task without specific simulation (the responsibility rests on the trainer to make the assessment of the trainee and their own supervision skills). We need to encourage all Heads of Schools, Training Programme Directors and College Tutors to make sure that the opportunities are created and trainees are aware of their options.

How to approach simulation

The trainee should start by revising the anatomy and familiarizing themselves with the required instrumentation. Simulation should be approached and/or assessed in a modular/step-wise form where possible, as listed below.

It should follow initial training on the correct techniques; watching a consultant operating/a video of techniques e.g. on Simulated Ocular Surgery website/a surgical DVD atlas/agreed local videos. The exact technique to be followed will be up to each trainer.

Initially a 10 minute tutorial to ensure correct instrument handling and technique is recommended followed by up to 30 minutes of supervised practice. Solo practice afterwards is essential. The exact length of time required for practice will depend on the individual trainee, however as a starting point it may be appropriate to assume that the trainee should undertake 10 muscle surgery or glaucoma procedures i.e. trabeculectomies.

The surgery is listed below in step-wise manner but training does not have to follow these steps in order and it may be advantageous not to. Examples are given for the different areas below.

Then assessment of technique and outcome is required. This may be by photographs/video/supervised surgery. It is also helpful for senior input and review of technique during the practice period particularly in

cataract surgery and senior trainees can be encouraged to supervise more junior trainees as this enhances their own learning experience too.

Assessment tools should look at all the steps of the procedure and surgical OSATS or OSCAR/OSSCAR* may be used as available. (It is anticipated that further will become available in the near future). OSSCAR tools allow scoring to advance from novice, through advanced beginner to competent.

Documentation of this assessment should be uploaded to the trainee's portfolio.

In future it should also be possible for simulated surgery to be included in the Eye logbook and clearly identified. Alternatively a wet-lab notebook could be kept and uploaded as a resource to the portfolio. The local School of Ophthalmology will choose how simulated surgery will be assessed according to facilities available in their particular school. They should clearly define what is required of their trainees and assess/document this at ARCP.

Trainees can be exposed to live surgery when they have shown they can perform the steps of the procedure competently. As traditionally undertaken in cataract surgery training, trainees should aim to string the steps of the procedure together before attempting an entire case. Simulation should, however, be encouraged to continue alongside live surgery as a way to improve and reinforce learning. In the overall surgical skills listed below there is clearly some overlap and therefore it is accepted that a trainee signed off in a step in one area will be able to consider that as a sign off in another e.g in Trauma: muscle disinsertion is clearly covered in muscle/strabismus surgery.

For most surgery pig's eyes/cadaver material/model eyes may be used and may almost be interchangeable. The College Skills Board and even very low fidelity solutions, such as fruit peel for making a trabeculectomy flap, may be appropriate also. For oculoplastic procedures then College boards for suturing may be used, pigs skin/eyelid or cadaveric courses may be an opportunity. Clearly options for simulation are more limited for this subject area currently.

Skill	Simulation details	Year of attainment
Incision and paracentesis formation	Artificial eyes Pigs' eyes Cadaveric material	ST1-2 but may also benefit later years
Viscoelastic safe and correct use	Artificial eyes Pigs' eyes	ST1-2 but may also benefit later years
Capsulorrhexis: commencement of flap	Low fidelity options eg Grape skins, cellophane wrap Artificial eyes Pigs' eyes Virtual simulator	ST1-2 but may also benefit later years
Capsulorrhexis: formation and circular completion	Low fidelity options Artificial eyes Pigs' eyes Virtual simulator	ST1-2 but may also benefit later years
Hydrodissection: visible fluid wave and free nuclear rotation	Artificial eyes Pigs' eyes	ST1-2 but may also benefit later years

Phacoemulsification probe and second instrument insertion, effective use and stability in eye	Artificial eyes Pigs' eyes Virtual simulator	ST1-2 but may also benefit later years
Nucleus: sculpting or primary chop	Artificial eyes Pigs' eyes Virtual simulator	ST1-2 but may also benefit later years
Nucleus: rotation and manipulation	Artificial eyes Pigs' eyes Virtual simulator	ST1-2 but may also benefit later years
Nucleus: chopping or cracking	Artificial eyes Pigs' eyes Virtual simulator	ST1-2 but may also benefit later years
Nucleus: segment removal	Artificial eyes Pigs' eyes Virtual simulator	ST1-2 but may also benefit later years
Irrigation and aspiration with adequate removal cortex	Artificial eyes Pigs' eyes Virtual simulator	ST1-2 but may also benefit later years
Lens insertion, rotation and final position	Artificial eyes Pigs eye	ST1-2 but may also benefit later years
Wound closure, hydration/suturing checking security	Artificial eyes Pigs' eyes, cadaveric material College Skills Board	ST1-2 but may also benefit later years
Anterior vitrectomy	Artificial eyes	ST2-3 but may also benefit later years
Global indices		
Tissue handling of conjunctiva cornea, iris, capsule	Artificial eyes Pigs' eyes, cadaveric material Virtual simulator	ST1-2 but may also benefit later years
Eye positioning and use of microscope	Artificial eyes Pigs' eyes, cadaveric material Virtual simulator	ST1-2 but may also benefit later years
Overall speed and fluidity of procedure	Artificial eyes Pigs' eyes, cadaveric material Virtual simulator	ST1-2 but may also benefit later years

In comparison as the EyeSi simulator is available in each/adjacent regions the options for cataract surgery are more diverse. It is therefore recommended that trainees utilize the EyeSi and additionally other forms of cataract surgery simulation.

There is probably also a need for regional specific surgical skills courses as well as those based at RCOphth. Certificates of successful completion of such courses could be uploaded to the portfolio.

Cataract Surgery (SS4)

Cataract simulation can be achieved by a number of methods and it is possible to use low-tech/fidelity solutions as a material to practice capsulorrhexis for example. An operating microscope should be available for simulation practice.

Where there is a virtual simulator in a region or nearby this should be taken advantage of. The College also has a simulator that can be pre-booked for sessional use.

Note: Simulated ocular surgery eyes are very suitable and may be set up to simulate the management of complications such as capsule rupture and vitreous loss

OSATS 1 is appropriate for this: <http://curriculum.rcophth.ac.uk/assessments/osats>

An ICO-OSCAR is available for phacoemulsification and may be modifiable for simulation:

<http://www.icoph.org/resources/230/Surgical-Assessment-Tool-ICO-OSCAR-in-English-Spanish-Chinese-Portuguese-Vietnamese-and-French.html>

An OSSCAR is available from the Simulated Ocular Surgery website:

<http://simulatedocularsurgery.com/simulation/cataract/>

Surgery for raised IOP/Glaucoma (SS5)

<u>Skill</u>	<u>Simulation details</u>	<u>Year of attainment</u>
Globe positioning: corneal traction suture	Artificial eyes Cadaver material/pigs' eyes	ST3-7 but could be undertaken by ST1-2
Conjunctival peritomy/incision and Tenon's dissection	Simulated ocular surgery eyes Cadaver material/pigs' eyes	ST3-7 but could be undertaken by ST1-2
Safe application of antimetabolite	Simulated ocular surgery eyes Cadaver material/pigs' eyes	ST3-7 but could be undertaken by ST1-2
Formation of scleral flap	Artificial eyes Cadaver material/pigs' eyes Other e.g. Fruit peel etc	ST3-7 but could be undertaken by ST1-2
Entry into AC, formation of sclerostomy with punch	College Skills Board Artificial eyes Cadaver material/pigs' eyes	ST3-7 but could be undertaken by ST1-2
Peripheral iridectomy	Artificial eyes Cadaver material/pigs' eyes	ST3-7 but could be undertaken by ST1-2
Placement releasable and/or fixed flap sutures	College Skills Board Artificial eyes Cadaver material/pigs' eyes Other e.g. Fruit peel etc	ST3-7 but could be undertaken by ST1-2
Conjunctival closure	Simulated ocular surgery eyes Cadaver material	ST3-7 but could be undertaken by ST1-2
Reformation anterior chamber by paracentesis/use AC chamber maintainer	Artificial eyes Cadaver material/pigs' eyes	ST3-7 but could be undertaken by ST1-2
Global indices		
Tissue handling	Artificial eyes Cadaver material	ST3-7 but could be undertaken by ST1-2
Technique of holding suture needle in needle holder	College Skills Board Artificial eyes Cadaver material	ST3-7 but could be undertaken by ST1-2
Tying of surgical knots	College Skills Board Artificial eyes Cadaver material	ST3-7 but could be undertaken by ST1-2

OSATS 1 is appropriate for this: <http://curriculum.rcophth.ac.uk/assessments/osats>

An OSSCAR is available from the Simulated Ocular Surgery website:
<http://simulatedocularsurgery.com/simulation/glaucoma/>

Repair Trauma (SS6)

(potentially covering SS13 Removal of eye)

It would be useful to have an interactive video on e-learning on “The approach to the traumatized eye” to be undertaken first.

Skill	Simulation details	Year of attainment
Sccleral suturing	College Skills Board Artificial eyes Cadaver material	ST3-7 but could be undertaken by ST1-2
Corneal suturing	College Skills Board Artificial eyes Cadaver material	ST3-7 but could be undertaken by ST1-2
Conjunctival peritomy/incision and Tenon’s dissection	Artificial eyes Cadaver material	ST3-7 but could be undertaken by ST1-2
Exposure of rectus muscle	Artifiicial eyes Cadaver material	ST3-7 but could be undertaken by ST1-2
Placement of suture in muscle	College Skills Board Artificial eyes Cadaver material	ST3-7 but could be undertaken by ST1-2
Disinsertion of muscle	Artificial eyes Cadaver material	ST3-7 but could be undertaken by ST1-2
Reattachment of muscle: intrascleral needle pass	College Skills Board Artificial eyes Cadaver material	ST3-7 but could be undertaken by ST1-2
Conjunctival closure (when appropriate)	Artificial eyes Cadaver material	ST3-7 but could be undertaken by ST1-2
Wound/lid repair	College Skills Boards Pigs skin/eyelid	ST1-2
Canalicular repair	Pigs skin/eyelid Cadaver material	ST3-7
Corneal glueing	Pig’s eyes, Cadaveric material Artificial eyes Discarded corneal buttons if available	ST3-7
Global indices		
Tissue handling	Artificial eyes Cadaver material	ST3-7 but could be undertaken by ST1-2
Technique of holding suture needle in needle holder	College Skills Board Artificial eyes Cadaver material	ST3-7 but could be undertaken by ST1-2
Tying of surgical knots	College Skills Board Artificial eyes Cadaver material	ST3-7 but could be undertaken by ST1-2

Note Simulated Ocular surgery eyes available for this

Note the DOPS form can be used for corneal glueing: <http://curriculum.rcophth.ac.uk/assessments/dops>

OSATS 1 is appropriate for this: <http://curriculum.rcophth.ac.uk/assessments/osats>

Common lid surgery /Oculoplastics (SS7)

(potentially covering principles for SS8, SS9, SS10 and SS11 i.e. surgery for surface protection, lateral canthotomy/cantholysis, biopsy, temporal artery biopsy)

Skill	Simulation details	Year of attainment
Basic skin suturing	College Skills Boards Pigs skin/eyelid	ST1-2
Wound/lid repair	College Skills Boards Pigs skin/eyelid	ST1-2
Pentagon excision	Pigs skin/eyelid Pigs head Cadavers either fresh frozen or thiel prep	ST2-7
Flap formation	Pigs skin/eyelid Pigs head Cadavers either fresh frozen or thiel prep	ST3-7
Lateral tarsal strip	Pigs skin/eyelid Pigs head Cadavers either fresh frozen or thiel prep	ST3-7
Global indices		
Tissue handling	Artificial eyes Cadaver material	ST3-7 but could be undertaken by ST1-2
Technique of holding suture needle in needle holder	College Skills Board Artificial eyes Cadaver material	ST3-7 but could be undertaken by ST1-2
Tying of surgical knots	College Skills Board Artificial eyes Cadaver material	ST3-7 but could be undertaken by ST1-2

This subspecialty will require further work potentially to list specific skills within above procedures.

OSATS 1 is appropriate for this: <http://curriculum.rcophth.ac.uk/assessments/osats>

An ICO-OSCAR is available for LTS and may be modifiable for simulation:

<http://www.icoph.org/resources/230/Surgical-Assessment-Tool-ICO-OSCAR-in-English-Spanish-Chinese-Portuguese-Vietnamese-and-French.html>

Muscle surgery/Strabismus (SS12)

It would be expected that the trainee would start with basic steps of scleral suturing and muscle suturing. They would then progress to specific recession and resection techniques, followed by conjunctival and Tenon's capsule dissection and closure.

Skill	Simulation details	Year of attainment
Globe stabilization	Simulated ocular surgery eyes Cadaver material	ST3-7 but could be undertaken by ST1-2
Conjunctival incision and Tenon's dissection	Simulated ocular surgery eyes Cadaver material	ST3-7 but could be undertaken by ST1-2
Hooking rectus muscle	Simulated ocular surgery eyes Cadaver material	ST3-7 but could be undertaken by ST1-2
Exposure of rectus muscle	Simulated ocular surgery eyes Cadaver material	ST3-7 but could be undertaken by ST1-2
Placement of suture in muscle	College Skills Board Simulated ocular surgery eyes Cadaver material	ST3-7 but could be undertaken by ST1-2
Disinsertion of muscle	Simulated ocular surgery eyes Cadaver material	ST3-7 but could be undertaken by ST1-2
Use of caliper/scleral ruler	Simulated ocular surgery eyes Cadaver material	ST3-7 but could be undertaken by ST1-2
Reattachment of muscle: intrascleral needle pass	College Skills Board Simulated ocular surgery eyes Cadaver material	ST3-7 but could be undertaken by ST1-2
Conjunctival closure (when appropriate)	Simulated ocular surgery eyes Cadaver material	ST3-7 but could be undertaken by ST1-2
Global indices		
Tissue handling	Artificial eyes Cadaver material	ST3-7 but could be undertaken by ST1-2
Technique of holding suture needle in needle holder	College Skills Board Artificial eyes Cadaver material	ST3-7 but could be undertaken by ST1-2
Tying of surgical knots	College Skills Board Artificial eyes Cadaver material	ST3-7 but could be undertaken by ST1-2

OSATS 1 is appropriate for this: <http://curriculum.rcophth.ac.uk/assessments/osats>

An ICO-OSCAR is available for strabismus surgery and may be modifiable for simulation:

<http://www.icoph.org/resources/230/Surgical-Assessment-Tool-ICO-OSCAR-in-English-Spanish-Chinese-Portuguese-Vietnamese-and-French.html>

An OSSCAR is available from the Simulated Ocular Surgery website:

<http://simulatedocularsurgery.com/simulation/strabismus/>

Laser (SS14, SS15, SS16)

All Trainees should have formal training on laser treatment of specific eye conditions before undertaking treatment of patients.

Part task simulation is available to practice:

Skill	Simulation details	Year of attainment
Yag laser iridotomy	EyeTechUSA simulated eye device	ST3 though useful ST1-7
Yag laser capsulotomy	EyeTechUSA simulated eye device	ST3 though useful ST1-7
Retinal focal laser	EyeTechUSA simulated eye device, paper targets or 35mm slides with retinal pathology, "Reti-Eye" Gulden Ophthalmics	ST3 though useful ST1-7
Pattern laser treatment	EyeTechUSA simulated eye device, paper targets or 35mm slides with retinal pathology, "Reti-Eye" Gulden Ophthalmics	ST3 though useful ST1-7
Indirect laser to retina	Simulated eye for indirect ophthalmoscopy "Reti-Eye" Gulden Ophthalmics	ST3 though useful ST1-7
Selective laser trabeculoplasty	Gulden Ophthalmics model eye for anterior chamber angle examination	ST3 though useful ST1-7

Note the DOPS form can be used for all laser procedures:

<http://curriculum.rcophth.ac.uk/assessments/dops>

Specifically however, there should be safety training where a "Dual" YAG Laser and SLT machine is used. In addition there will be local "safety" training provided at local Trust level with which all laser users should comply.

Training courses should be available nationally or at School/regional level and could be formed in a "blended" structure where pre-course knowledge acquisition is by means of e-Learning available from e-LfH via the Eye-Site section of the RCOphth web site and where the practical course makes use of medical lasers in situ using various part-task simulation equipment. Trainers should be Consultant Clinical or Educational supervisors.

A course "recipe" is available for those wishing to set up a training course. (Appendix B)

Subsequently, Consultants supervising trainees performing laser treatments may observe the laser treatment in progress using slit lamp cameras, slit lamp viewing systems, or laser recording equipment, or by review of the treated patients.

Trainees should have formal recognition of attendance at a laser training course in addition to sign-off of WBAs on Laser treatments.

Compiled by Fiona Spencer with input from Simulation Group of Education Committee (Following forum 24092014)