Simulation Center
Manual Annexes
## Annexes

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How to set up a remote MSICS course

Meryem Altun Parent, Training and Innovation Coordinator
August 10, 2018

Before the Course Starts

It is important to ensure that the partner hospital is adequately prepared for the delivery of the remote wet lab training. To achieve this, a visit to the partner hospital by the project manager and the volunteer faculty is essential to:

- inspect the setting
- identify the required supplies and equipment
- ensure their purchase and installation of above
- ensure that the above are ready to use

This visit should be scheduled by the project manager according to the volunteer faculty's and the hospital's availability.

Course Preparation

Prior to the first lecture, the project manager should:

1. Collaborate with the Cybersight team to build the course in Cybersight Learn.
2. Provide a Cybersight orientation including:
   - creation of a Cybersight account
   - navigating the course
   - recording and uploading assignments
   - initiating online communication with the volunteer faculty
   - accessing other available open source educational materials
3. Connect with the volunteer faculty to assist him/her in registering with Cybersight and provide an orientation on using the course platform.
4. Register course participants, with the help of the Cybersight team, and provide an orientation to the course.
5. Run an IT test to ensure that the course will work without any complications.
6. Coordinate all logistics, schedule the weekly lectures and update the volunteer faculty regularly.
About the Course

The duration of the course is seven weeks in total. Week 0 and 6 are for pre- and post-course videos recorded by the residents. These videos will be uploaded by the residents to Cybersight, graded independently, and marked by an external grader. If the volunteer faculty would like to optionally review these, they may, but they are not obligated to grade them.

The volunteer faculty will deliver the first lecture\(^1\) at the partner hospital during their visit. Then, for four weeks, the volunteer faculty will remotely deliver weekly live lectures through a video conference platform, Zoom (zoom.us), to the residents at the partner hospital. Every lecture will cover specific steps in MSICS. An example schedule is added at the end of this document (see Appendix 1).

The residents will practice the week's MSICS steps on either animal eyes or model eyes under video recording. They will then submit a video assignment demonstrating mastery to Cybersight within four days of the wet lab lecture session. The project manager should send a prompt to the volunteer faculty when the assignment is uploaded and ready for review, at which point the videos can be evaluated and graded using the Ophthalmic Simulated Surgical Competency Assessment Rubric - MSICS (OSSCAR-SCIS) (see Appendix 2), created by Simulated Ocular Surgery (simulatedocularsurgery.com) and adapted from the International Council of Ophthalmology (www.icoph.org).

The residents need to achieve a competency of 1 per assignment to be eligible to proceed in the course. In the system 1=80% and 2=100%.

\(^1\) Note: after the first time the course is delivered, it will no longer be necessary to do the first lecture in person, and all sessions can be done remotely.
## Example Schedule:

<table>
<thead>
<tr>
<th>Date/Time (La Paz)</th>
<th>Week</th>
<th>Model</th>
<th># of Eyes / Resident</th>
<th>Lecture Topic</th>
<th>Mentor</th>
<th>Video Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-course videos by June 13</td>
<td>0</td>
<td>Artificial Eye</td>
<td>3 eyes each</td>
<td>No lecture</td>
<td>Residents by themselves</td>
<td>Upload three complete MSICS simulation cases to Cybersight per participant</td>
</tr>
<tr>
<td>13 June 5pm</td>
<td>1</td>
<td>Pig Eye</td>
<td>5 eyes each</td>
<td>MSICS Instruments; Wound Construction</td>
<td>Dr. Pamela Remote Session + Dr. Pamela remote video assessment</td>
<td>Video One: 10 wound marking and construction of the sclera-corneal tunnel</td>
</tr>
<tr>
<td>22 June 5pm</td>
<td>2</td>
<td>Pig Eye</td>
<td>5 eyes each</td>
<td>Paracentesis and Viscoelastic</td>
<td>Dr. Pamela Remote Session + Dr. Pamela remote video assessment</td>
<td>Video Two: 20 Paracentesis and entering with cannula through para 20 times Video Three: 20 Keratome incisions</td>
</tr>
<tr>
<td>29 June 5pm</td>
<td>3</td>
<td>Artificial Eye</td>
<td>1 eye each + sufficient film to practice</td>
<td>Capsulorhexis</td>
<td>Dr. Pamela Remote Session + Dr. Pamela remote video assessment</td>
<td>Video Four: 10 Capsulorhexis</td>
</tr>
<tr>
<td>6 July 5pm</td>
<td>4</td>
<td>Pig Eye</td>
<td>10 eyes each</td>
<td>Hydrodissections; Nucleus Extraction and Cortical Cleanup</td>
<td>Dr. Pamela Remote Session + Dr. Pamela remote video assessment</td>
<td>Video Five: 5 Hydrodissections; 5 Nucleus rotations in the bag Video Six: 5 Nucleus extractions</td>
</tr>
<tr>
<td>13 July 5pm</td>
<td>5</td>
<td>Pig Eye</td>
<td>3 eyes each</td>
<td>IOL Insertion and Wound Closure</td>
<td>Dr. Pamela Remote Session + Dr. Pamela remote video assessment</td>
<td>Video Seven: 3 IOL insertions in the bag Video Eight: 3 wound closures with sutures</td>
</tr>
<tr>
<td>Post-course videos by 20 July</td>
<td>6</td>
<td>Artificial Eye</td>
<td>3 eyes each</td>
<td>No lecture</td>
<td>Residents by themselves</td>
<td>Upload three complete MSICS simulation cases to Cybersight per participant</td>
</tr>
</tbody>
</table>
# Ophthalmic Simulated Surgical Competency Assessment Rubric – Manual Small Incision Cataract Surgery (Sim-OSSCAR:SICS)

**Trainee:** .................................................................................................................... **Evaluator:** .................................................................................................................. **Date:** ....................................................................................................................

### Ophthalmic Simulated Surgical Competency Assessment Rubric – Manual Small Incision Cataract Surgery (Sim-OSSCAR:SICS)

<table>
<thead>
<tr>
<th></th>
<th>Novice (score = 0)</th>
<th>Advanced Beginner (score = 1)</th>
<th>Competent (score = 2)</th>
<th>Score (Not done score = 0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Scleral fixation</td>
<td>No scleral fixation; inappropriate place; tissue trauma.</td>
<td>Appropriate position of scleral fixation, but needs to re-grip. Mild tissue trauma.</td>
<td>Good position of fixation, no need to re-grip, no trauma. Firm and stable scleral fixation throughout scleral tunnel formation.</td>
</tr>
<tr>
<td>2</td>
<td>Scleral incision</td>
<td>Inappropriate location, shape and size; hesitant incision.</td>
<td>Either one of the incision location, shape or size is incorrect.</td>
<td>Good incision location, shape and size.</td>
</tr>
<tr>
<td>3</td>
<td>Paracentesis</td>
<td>Trauma to iris or anterior capsule on entry.</td>
<td>Inappropriate location, width, length, or timing. Anterior chamber mostly stable.</td>
<td>Wound of adequate length, width, and correct location.</td>
</tr>
<tr>
<td>4</td>
<td>Viscoelastic insertion</td>
<td>Inappropriate tunnel depth, resistant dissection. Button-hole and/or premature entry.</td>
<td>Administers viscoelastic, but one of appropriate time, amount, or cannula position are incorrect.</td>
<td>Viscoelastic administered in appropriate amount, at appropriate time, with cannula tip clear of lens capsule and endothelium.</td>
</tr>
<tr>
<td>5</td>
<td>Viscoelastic insertion</td>
<td>Does not extend &gt;1mm into clear cornea.</td>
<td>Able to dissect forward, and understands that tunnel depth is incorrect but unable to correct.</td>
<td>Tunnel constructed at correct plane. If inappropriate plane, able to rectify.</td>
</tr>
<tr>
<td>6</td>
<td>Sclero-corneal tunnel</td>
<td>Does not extend into clear cornea.</td>
<td>Does not extend &gt;1mm into clear cornea, internal tunnel not wider than external.</td>
<td>Extends tunnel into clear cornea &gt;1mm, wider limbal corneal tunnel than at scleral incision.</td>
</tr>
<tr>
<td>7</td>
<td>Corneal entry</td>
<td>Hesitant keratome entry into AC.</td>
<td>Entry at mostly right plane. Able to extend but with repeated use of viscoelastic, internal valve irregular. Require wound extension or suturing.</td>
<td>Fluently enters in right plane. Wound length adequate with no further need for extension. Retains viscoelastic during extension.</td>
</tr>
<tr>
<td>8</td>
<td>Capsulotomy / Capsulorrhexis start</td>
<td>Tentative; size and position are inadequate for nucleus density, incorrect capsulotomy position.</td>
<td>Mostly in control, slow initial start. Capsulotomy in correct position.</td>
<td>Correct and smooth start to capsulotomy / capsulorrhexis. Delicate approach and confident control of cystotome.</td>
</tr>
<tr>
<td>9</td>
<td>Capsulotomy / Capsulorrhexis completion</td>
<td>Tentative; size and position are inadequate for nucleus density, incorrect capsulotomy position.</td>
<td>Mostly in control, few awkward or repositioning movements. Capsulotomy in correct position. Radial tear corrected.</td>
<td>Adequate size and position for nucleus density, no tears, AC depth throughout the capsulorrhexis. Appropriate final capsulotomy for IOL size.</td>
</tr>
<tr>
<td>10</td>
<td>Hydro-dissection: Visible fluid wave and free prolapse of one pole of nucleus</td>
<td>Hydrodissection fluid not injected in quantity or place to achieve nucleus rotation or prolapse.</td>
<td>Fluid injected in appropriate location, able to prolapse one pole of nucleus but encounters more than minimal resistance.</td>
<td>Ideally see free fluid wave, adequate for free nuclear hydroprolapse or mechanical prolapse with minimal resistance.</td>
</tr>
<tr>
<td>11</td>
<td>Injection of viscoelastic</td>
<td>Doesn’t inject viscoelastic into eye.</td>
<td>Injects insufficient viscoelastic. Injects only into PC or AC.</td>
<td>Injects adequate viscoelastic into capsule bag behind nucleus, and AC.</td>
</tr>
<tr>
<td>12</td>
<td>Injection of viscoelastic</td>
<td>Unable to dial nucleus into AC. Hooks anterior nuclear surface. Iris and corneal touch.</td>
<td>Multiple attempts required to prolapse upper equator of nucleus into AC with more than minimal resistance. No corneal touch.</td>
<td>Prolapse of upper equator with minimal resistance. No damage to pupil and iris.</td>
</tr>
<tr>
<td>13</td>
<td>Nucleus extraction</td>
<td>Damages endothelium, iris or capsule, unable to hold and extract nucleus, movements not coordinated. Pierses posterior capsule.</td>
<td>Removes nucleus after repeated attempts, more than one piece, might need wound extension prior to extraction.</td>
<td>Extracts nucleus with one or two attempts; proper wound size in relation to nuclear density.</td>
</tr>
<tr>
<td>14</td>
<td>IOL insertion</td>
<td>Grips IOL incorrectly, inserts IOL incorrectly, multiple attempts.</td>
<td>Hesitant insertion of IOL, more than one attempt to insert.</td>
<td>Inserts IOL into capsular bag efficiently, correctly, and in first attempt.</td>
</tr>
</tbody>
</table>

### GLOBAL INDICES

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<table>
<thead>
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</thead>
<tbody>
<tr>
<td>15</td>
<td>Wound neutrality and minimizing eye rolling and corneal distortion. Nearly constant eye movement and corneal distortion. Eye usually in primary position, mild corneal distortion folds occur. The eye is kept in primary position during the surgery. No distortion folds are produced. The length and location of incisions prevents distortion of the cornea.</td>
</tr>
<tr>
<td>16</td>
<td>Eye positioned centrally within microscope view. Constants requires repositioning. Mild fluctuation in pupil position. The pupil is kept centered during the surgery.</td>
</tr>
<tr>
<td>17</td>
<td>Scleral and corneal tissue handling. Tissue handling is rough and damage occurs. Tissue handling decent but potential for damage exists. Tissue is not damaged nor at risk by handling.</td>
</tr>
<tr>
<td>18</td>
<td>Intraocular spatial awareness. Instruments often in contact with capsule, iris, corneal endothelium; blunt second instrument not kept in appropriate position. Rare contact with capsule, iris, endothelium. Often has blunt second hand instrument in inappropriate position. No accidental contact with capsule, iris, corneal endothelium. Blunt, second hand instrument is kept in appropriate position.</td>
</tr>
<tr>
<td>19</td>
<td>Overall fluidity of procedure. Hesitant, frequent starts and stops, not at all fluid. Occasional inefficient and/or unnecessary manipulations occurs. Inefficient and/or unnecessary manipulations are avoided.</td>
</tr>
<tr>
<td>20</td>
<td>Overall speed of procedure. Case duration more than 30 minutes, not completed. Case duration 20-30 minutes. Case duration less than 20 minutes.</td>
</tr>
</tbody>
</table>

TOTAL

**Good Points:** .......................................................................................................................... **Suggestions for development:** ..............................................................................................................

*Based on the International Council of Ophthalmology (ICO)-Ophthalmology Surgical Competency Assessment Rubric-SICS (ICO-OSCAR: SICS)*
## Artificial Model Eye Product Guide

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<th>Artificial Eyes Preferred Providers</th>
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<td>Phaco</td>
<td>Kitaro (CCC), Phillips Eye</td>
</tr>
<tr>
<td>MSICS</td>
<td>Phillips Eye</td>
</tr>
<tr>
<td>Valve</td>
<td>Phillips Eye</td>
</tr>
<tr>
<td>Trabeculectomy</td>
<td>Phillips Eye</td>
</tr>
<tr>
<td>MIGS</td>
<td>Simuleye (for KDB)</td>
</tr>
<tr>
<td>Strabismus</td>
<td>Phillips Eye, Bioniko (for Pterygium only)</td>
</tr>
<tr>
<td>Indirect Ophthalmoscopy</td>
<td>Bioniko (Retinopexia, Posterior Model)</td>
</tr>
</tbody>
</table>

### Evaluation/Notes (Those marked in red represent the preferred model):

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<th>Valve</th>
<th>Trabeculectomy</th>
<th>MIGS</th>
<th>Strabismus</th>
<th>Indirect Ophthalmoscopy</th>
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<tbody>
<tr>
<td>Kitaro</td>
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<tr>
<td></td>
<td>CCC: The feeling of the rhexis material resembles the real one the most. It is easy to switch from rhexis to a new rhexis. It can recreate white cataracts.</td>
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<tr>
<td></td>
<td>The feeling of the tunnel resembles the real one the most. Careful with the point unites the sclera and cornea where most times a buttonhole appears. It is hard to take the nucleus out; most times a fish hook is needed.</td>
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</tr>
<tr>
<td></td>
<td>The feeling of the sclera is very good for suturing; however, it is almost impossible to create a scleral tunnel; therefore only good to teach tuitoplast or scleral patch.</td>
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<tr>
<td></td>
<td>It is difficult to find the trabeculum since you can only enter the eye in a certain sector, and only one sector has trabeculum; therefore, it is a one-use only. Trabeculum feeling with Kahook dual blade is 5/10.</td>
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<td></td>
<td>The models have obliques. The feeling of the muscles resembles the real ones the most. Color choices are accurate.</td>
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<tr>
<td>Phillips Eye</td>
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<td></td>
<td>Hard cataract model (halves without colored iris) for phaco. Use for advanced model. The cataract material resembles the real one the most: best one for divide and conquer.</td>
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<tr>
<td></td>
<td>The feeling of the rhexis material resembles the real one the most. Careful with the point unites the sclera and cornea where most times a buttonhole appears. It is hard to take the nucleus out; most times a fish hook is needed.</td>
<td></td>
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<td>The models have obliques. The feeling of the muscles resembles the real ones the most. Color choices are accurate.</td>
<td></td>
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<tr>
<td>Bioniko</td>
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<tr>
<td></td>
<td>Rhesis 2: It has too much memory, doesn't fold on itself, breaks easily, and stains with trypan blue. Phaco model: Nucleus looks realistic, but the material is too soft to practice divide and conquer. Empty bag model: I don't see any use for it Kerato: It is excellent to practice corneal sutures, but you can't bury the knots. (Used Phillips eyes corneas could be reused)</td>
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<tr>
<td></td>
<td>MSICS: The sclera is too tough. The sclera and the cornea breaks. The rhexis has too much memory; doesn't fold on itself. The nucleus can't be popped out of the bag with water; only good for takeout maneuver.</td>
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<td></td>
<td>Cordelia: This model is excellent to practice evisceration-enucleation, but again, real blind eyes too.</td>
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<tr>
<td></td>
<td>OJOS oph: If you only use the external material as the sclera, the feeling is fine. Color choices are bad (an apple could be used for this instead).</td>
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<td></td>
<td>MIGS: Visualization 7/10; only one sector has trabeculum, and feeling of it is 7/10</td>
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<tr>
<td></td>
<td>Strabismus (models with muscles): This is the best eye to train in pterygium. The material for suturing and the feeling of it is excellent. Color choices are bad.</td>
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<tr>
<td></td>
<td>Retinopexia, Posterior Model: It is excellent to practice visualization; laser doesn't leave marks behind. One could test membrane peel.</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Will Mack</td>
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<tr>
<td></td>
<td>It is good for placing the hooks (cornea too stiff) but the iris material is too much memory, therefore they don't stay in place. It is excellent to practice iris sutures and Malyugin ring insertion (depends on price, but the Phillips models with a color iris can be reused). Vitreous: It is an excellent model, has a very similar feeling to the vitreous (depends on the price, but the Phillips advance cataract models can be filled with egg white).</td>
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<tr>
<td></td>
<td>For KDB: The visualization is excellent; trabeculum is 3/10. Therefore it can be reused. The procedure feeling is 9/10.</td>
<td></td>
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<tr>
<td>Simuleye</td>
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</tr>
<tr>
<td></td>
<td>The head looks amazing, but the conjunctiva and muscles break easily.</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**Artificial Eyes Preferred Providers**

- **Phaco**: Kitaro (CCC), Phillips Eye
- **MSICS**: Phillips Eye
- **Valve**: Phillips Eye
- **Trabeculectomy**: Phillips Eye
- **MIGS**: Simuleye (for KDB)
- **Strabismus**: Phillips Eye, Bioniko (for Pterygium only)
- **Indirect Ophthalmoscopy**: Bioniko (Retinopexia, Posterior Model)
## Sample Evaluation Form Basic Eyesi® Cataract Course

<table>
<thead>
<tr>
<th>Type of Training</th>
<th>Feature</th>
<th>Target achievement</th>
<th>Efficiency</th>
<th>Instrument handling</th>
<th>Tissue treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Navigation Training</td>
<td>Level 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anti-Tremor</td>
<td>Level 1-3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capsulorhexis</td>
<td>Level 1-3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydro Maneuvers</td>
<td>Level 1-2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phaco Training</td>
<td>Level 1-3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phaco Divide and Conquer</td>
<td>Level 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irrigation and Aspiration</td>
<td>Level 1-3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IOL Insertion</td>
<td>Level 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comments:**

---

**Signature Trainer**

**Signature Trainee**

*Author: Andreas Di Luciano, MD*
# Sample Evaluation Form Advanced Eyesi® Cataract Course

<table>
<thead>
<tr>
<th>Name of Host Institution:</th>
<th>Program Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Location:</td>
<td>Email address:</td>
</tr>
<tr>
<td>Name of Trainee:</td>
<td>Level of Training: Advanced</td>
</tr>
</tbody>
</table>

## Type of Training

### Capsulorhexis

<table>
<thead>
<tr>
<th>Feature</th>
<th>Reliability gate</th>
<th>Target achievement</th>
<th>Efficiency</th>
<th>Instrument handling</th>
<th>Tissue treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capsulorhexis (CAT-C)</td>
<td>Tension: Medium, without guiding elements</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capsulorhexis errant tear (CAT-D)</td>
<td>Tension: Medium - High</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capsulorhexis weak zonules (CAT-D)</td>
<td>Tension: Low - Medium</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Divide and Conquer

<table>
<thead>
<tr>
<th>Feature</th>
<th>Reliability gate</th>
<th>Target achievement</th>
<th>Efficiency</th>
<th>Instrument handling</th>
<th>Tissue treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydro Maneuver (CAT-C)</td>
<td>Level: 3</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydro Maneuver (CAT-C)</td>
<td>Level: 5</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phaco Divide and Conquer (CAT-C)</td>
<td>Level: 4</td>
<td>2</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Phaco Divide and Conquer (CAT-C)</td>
<td>Level: 5</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Chopping

<table>
<thead>
<tr>
<th>Feature</th>
<th>Reliability gate</th>
<th>Target achievement</th>
<th>Efficiency</th>
<th>Instrument handling</th>
<th>Tissue treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cracking &amp; Chopping (CAT-C)</td>
<td>Level: 5</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phaco Chopping (CAT-C)</td>
<td>Level: 5 Full nucleus horizontal</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Irrigation/ Aspiration

<table>
<thead>
<tr>
<th>Feature</th>
<th>Reliability gate</th>
<th>Target achievement</th>
<th>Efficiency</th>
<th>Instrument handling</th>
<th>Tissue treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irrigation and Aspiration (CAT-C)</td>
<td>Level: 3</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irrigation and Aspiration in weak zonules (CAT-D)</td>
<td>Level: 5</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### IOL insertion

<table>
<thead>
<tr>
<th>Feature</th>
<th>Reliability gate</th>
<th>Target achievement</th>
<th>Efficiency</th>
<th>Instrument handling</th>
<th>Tissue treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>IOL insertion</td>
<td>2 (IOL inserted, remove viscoelastic)</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## ANNEX D

<table>
<thead>
<tr>
<th>Type of Training</th>
<th>Total Score</th>
<th>Result of the Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capsulorhexis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Divide and Conquer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chopping</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irrigation/ Aspiration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IOL insertion</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comments:**

**Signature Trainer**

**Signature Trainee**

*Author: Andreas Di Luciano, MD*
ANNEX E

A Guide to Nursing Simulation Station Set-up

Xiao Ying Liu, Orbis Flying Eye Hospital Staff Nurse

1 Operating room (OR) training stations

1.1 Equipment training station (anterior & posterior machine set-up)

1.2 Surgical scrubbing sink and hand wash station

1.3 Gowning & gloving station

1.4 Sterile field set-up

1.5 Prepping surgical site station

1.6 Handling instruments

1.7 Sharps management station

Set-up of vitrectomy equipment

Set-up phacoemulsification equipment
ANNEX E

2. Sub-sterile (SS) simulation training stations

2.1 Manual cleaning/instrument washer/instrument transferring hatch/container station

2.2 SS instrument inspection/wrapping station

2.3 Biological/spore test station

2.4 Autoclave parameter set up
ANNEX E

3 Pre- & post-operative patient care training stations

3.1 Room and equipment set-ups for pre- & post-operative patient care training station

Beds, curtains, and chairs

3.2 Basic equipment

Patient monitor & accessories

Assorted sizes of blood pressure cuffs

Thermometer

Glucometers and accessories

Stethoscope

Portable manual blood pressure apparatus

Oxygen flow meter attached to piped oxygen outlet

Oxygen face mask or nasal prong

Suction Unit - piped or portable
3.3 Training stations

3.3.1 Hand wash station

3.3.2 IV cannulation station

3.3.3 Airway management station

Ambu bags
Oral airways
Pocket mask

3.3.4 Call/Code station

3.3.5 Low temperature management station/use of warmer
3.3.6 Common emergency drugs & MH mock drugs station (use expired drugs)

3.3.7 Crash cart/defibrillator/AED training station

- Drawer 1 – Emergency Medication
- Drawer 2 – IV
- Drawer 3 – Basic Airway
- Drawer 4 – Advanced Airway
- Defibrillator
- Defibrillation pads
- AED Training Station
# Sample Nursing Recovery Room and Sub-sterile Simulation Training Schedule

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 – 9:30</td>
<td>• Pre-operative patient preparation&lt;br&gt;• Safe &amp; effective preparation of the recovery area&lt;br&gt;• Importance of daily review of the emergency trolley according to policies and procedures</td>
<td>Pre-operative patient care</td>
</tr>
<tr>
<td>9:30 – 10:00</td>
<td>• Consent process for surgery/procedures&lt;br&gt;• Informed consent</td>
<td></td>
</tr>
<tr>
<td>10:00 – 10:30</td>
<td>• ‘Sign In’ pre-operative WHO checklists:&lt;br&gt;  ▪ Marking site surgery&lt;br&gt;  ▪ Fasting regimes&lt;br&gt;  ▪ Review of diabetes, hypertension, allergies&lt;br&gt;  ▪ Confirmation of lens/implants</td>
<td>Post-operative patient care</td>
</tr>
<tr>
<td>10:30 – 11:00</td>
<td>• Difference between general anesthesia and local anesthesia&lt;br&gt;• Patient monitoring</td>
<td></td>
</tr>
<tr>
<td>11:00 – 12:00</td>
<td>• Intravenous therapy&lt;br&gt;• Intravenous site care&lt;br&gt;• Identified potential complications</td>
<td></td>
</tr>
<tr>
<td>12:00 – 13:00</td>
<td><strong>Lunch</strong></td>
<td></td>
</tr>
<tr>
<td>13:00 – 14:00</td>
<td>• Common anesthetic agents used in the operating room&lt;br&gt;• Effects &amp; risks of anesthetic agents</td>
<td></td>
</tr>
<tr>
<td>14:00 – 15:00</td>
<td>• Post-operative patient assessment:&lt;br&gt;  ▪ Consciousness&lt;br&gt;  ▪ Cardiovascular and respiratory status&lt;br&gt;  ▪ Status of the post-op site&lt;br&gt;  ▪ Pain assessment and management&lt;br&gt;  ▪ Airway maintenance&lt;br&gt;  ▪ O2 therapy</td>
<td>Post-operative patient care</td>
</tr>
<tr>
<td>15:00 – 15:30</td>
<td>• Manage pain and nausea</td>
<td></td>
</tr>
<tr>
<td>15:30 – 16:00</td>
<td>• Discharge criteria&lt;br&gt;• Patient education and documentation</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>Activity</td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>8:30 – 9:30</td>
<td>Differences among steam, gas, and cold sterilization procedures</td>
<td></td>
</tr>
<tr>
<td>9:30 – 10:00</td>
<td>Decontamination and cleaning methods:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Manual cleaning</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Washing machine</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Ultrasound cleaner</td>
<td></td>
</tr>
<tr>
<td>10:00 – 10:30</td>
<td>Lubrication process for ophthalmic instruments</td>
<td></td>
</tr>
<tr>
<td>10:30 – 11:00</td>
<td>Inspection and assembly</td>
<td></td>
</tr>
<tr>
<td>11:00 – 11:30</td>
<td>Indicators:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Chemical</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Biologic</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Mechanic</td>
<td></td>
</tr>
<tr>
<td>11:30 – 12:00</td>
<td>Personal protective equipment (PPE)</td>
<td></td>
</tr>
<tr>
<td>12:00 – 13:00</td>
<td>Lunch</td>
<td></td>
</tr>
<tr>
<td>13:00 – 14:00</td>
<td>Sterilization monitoring method and quality control</td>
<td></td>
</tr>
<tr>
<td>14:00 – 14:30</td>
<td>• Conditions necessary for storage of sterilized items</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Event Related Sterility</td>
<td></td>
</tr>
<tr>
<td>14:30 – 15:00</td>
<td>• Handling ophthalmic instruments</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Use and transportation of instruments</td>
<td></td>
</tr>
<tr>
<td>15:00 – 16:00</td>
<td>Toxic Anterior Segment Syndrome (TASS) and endophthalmitis</td>
<td></td>
</tr>
</tbody>
</table>
## Sample Nursing OR Simulation Training Schedule

### Operating Room Training Schedule (Day One)

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 – 9:30</td>
<td>Role and responsibilities of circulator &amp; scrub nurse</td>
</tr>
<tr>
<td>9:30 – 10:00</td>
<td>Principles of operating room etiquette</td>
</tr>
<tr>
<td>10:00 – 11:00</td>
<td>Ophthalmic sutures</td>
</tr>
<tr>
<td>11:00 – 12:00</td>
<td>Supplies &amp; instruments used for cornea surgery</td>
</tr>
<tr>
<td>12:00 – 13:00</td>
<td>Lunch</td>
</tr>
<tr>
<td>13:00 – 14:00</td>
<td>Cornea surgery: Interaction with the surgeon (sequence of surgery &amp; anticipation of surgeon needs)</td>
</tr>
<tr>
<td>14:00 – 15:00</td>
<td>Supplies &amp; instruments used for glaucoma</td>
</tr>
<tr>
<td>15:00 – 16:00</td>
<td>Glaucoma surgery: Interaction with the surgeon (sequence of surgery &amp; anticipation of surgeon needs)</td>
</tr>
</tbody>
</table>

### Operating Room Training Schedule (Day Two)

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 – 9:30</td>
<td>Perform handling and disposal of cytotoxic drugs</td>
</tr>
<tr>
<td>9:30 – 10:30</td>
<td>Prevention of potential hazards during surgery: swab and instrument policy, handling of specimens, diathermy, laser, and lights</td>
</tr>
<tr>
<td>10:30 – 11:00</td>
<td>Handling of sharps within the surgical field and disposal of sharps (and linen when appropriate)</td>
</tr>
<tr>
<td>11:00 – 12:00</td>
<td>WHO ‘Time Out,’ ‘Sign Out’ SS checklist</td>
</tr>
<tr>
<td>12:00 – 13:00</td>
<td>Lunch</td>
</tr>
<tr>
<td>13:00 – 14:00</td>
<td>Centurion machine</td>
</tr>
<tr>
<td>14:00 – 14:30</td>
<td>Supplies &amp; instruments used for cataract (phaco &amp; MSICS)</td>
</tr>
<tr>
<td>14:00 – 15:00</td>
<td>Folding and vending IOLs</td>
</tr>
<tr>
<td>14:30 – 16:00</td>
<td>Phaco &amp; MICS surgery: interaction with the surgeon (sequence of surgery &amp; anticipation of surgeon needs)</td>
</tr>
</tbody>
</table>
### Operating Room Training Schedule (Day Three)

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 – 9:30</td>
<td>Pre-surgical handwashing</td>
</tr>
<tr>
<td>9:30 – 10:00</td>
<td>Gowning and gloving (open and closed technique)</td>
</tr>
<tr>
<td>10:00 – 10:30</td>
<td>Aseptic technique and setting up of sterile surgical field</td>
</tr>
<tr>
<td>10:30 – 11:00</td>
<td>Prepping and draping of patient</td>
</tr>
<tr>
<td>11:00 – 12:00</td>
<td>Ophthalmic meds used in the OR</td>
</tr>
<tr>
<td>12:00 – 13:00</td>
<td>Lunch</td>
</tr>
<tr>
<td>13:00 – 13:30</td>
<td>Constellation</td>
</tr>
<tr>
<td>13:30 – 14:00</td>
<td>Cryo machine</td>
</tr>
<tr>
<td>14:00 – 14:30</td>
<td>Supplies &amp; instruments used for retina &amp; vitrectomy surgeries</td>
</tr>
<tr>
<td>14:30 – 15:30</td>
<td>Vitrectomy surgery: interaction with the surgeon (sequence of surgery &amp; anticipation of surgeon needs)</td>
</tr>
<tr>
<td>15:30 – 16:00</td>
<td>Avastin injection</td>
</tr>
</tbody>
</table>

### Operating Room Training Schedule (Day Four)

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 – 9:30</td>
<td>Importance of safety checks on all equipment/machines</td>
</tr>
<tr>
<td>9:30 – 10:15</td>
<td>Cleaning regime</td>
</tr>
<tr>
<td>10:15 – 11:00</td>
<td>Intra-operative nursing notes</td>
</tr>
<tr>
<td>11:00 – 12:00</td>
<td>Supplies &amp; instruments used for OCP &amp; strabismus</td>
</tr>
<tr>
<td>12:00 – 13:00</td>
<td>Lunch</td>
</tr>
<tr>
<td>13:00 – 14:00</td>
<td>Entropion/ectropion surgery: interaction with the surgeon (sequence of surgery &amp; anticipation of surgeon needs)</td>
</tr>
<tr>
<td>14:00 – 15:00</td>
<td>Strabismus surgery: interaction with the surgeon (sequence of surgery &amp; anticipation of surgeon needs)</td>
</tr>
<tr>
<td>15:00 – 16:00</td>
<td>Chemical burns</td>
</tr>
</tbody>
</table>
# Nursing OR Competency Assessment

**Instructions:**
*Use one form per trainee. For each competency, allocate a score to the trainee’s level of execution of said skill: 1 for Novice, 2 for Advanced Beginner, and 3 for Competent. Each skill/competency has notes on what each level should be able to demonstrate.*

<table>
<thead>
<tr>
<th>Core Competencies</th>
<th>Novice</th>
<th>Advanced Beginner</th>
<th>Competent</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Describe the role and responsibilities of circulator</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Discuss the principles of theater etiquette</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Describe the role and responsibilities of the scrub nurse</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Perform daily and between patient OR cleaning</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Describe collection of supplies for different subspecialties</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 6. Demonstrate the ability to discuss safe, effective preparation of the operating theatre with regards to:  
   a. The patient  
   b. The environment  
   c. The staff |        |                   |                                                                           |                |
| 7. Describe collection of instruments and equipment needed for different subspecialties |        |                   |                                                                           |                |
| 8. Perform pre-surgical handwashing                                               |        |                   |                                                                           |                |
| 9. Perform gowning and gloving (open and closed technique)                        |        |                   |                                                                           |                |
| 10. Perform aseptic technique and setting up of sterile surgical field            |        |                   |                                                                           |                |
| 11. Perform WHO ‘Time Out’                                                        |        |                   |                                                                           |                |
| 12. Perform prepping and draping of patient                                       |        |                   |                                                                           |                |
| 13. Identify anatomy of the structures of the eye being operated on               |        |                   |                                                                           |                |
## Core Competencies

<table>
<thead>
<tr>
<th></th>
<th>Novice</th>
<th>Advanced Beginner</th>
<th>Competent</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>14. Demonstrate knowledge of the disease process of the different subspecialties</td>
<td>Does not perform at all (score = 1)</td>
<td>Performs part of, but not all the steps or actions required (score = 2)</td>
<td>Fully performs and demonstrates the skill in line with accepted protocols (score = 3)</td>
<td></td>
</tr>
<tr>
<td>15. Discuss potential hazards during surgery and the precautions necessary to prevent them where appropriate:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Swab and instrument policy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Handling of specimens</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Diathermy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Laser</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. Lights</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Identify the instrument trays used during the different subspecialties</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. Perform checks of the instrument tray pre- and post-operatively</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. Discuss the importance of safety checks on all equipment/machines</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. Discuss and demonstrate the delivery of sterile items to the surgical field to maintain sterility</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. Demonstrate knowledge of the sequence of the surgery and which instrument used to anticipate surgeon's needs</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>21. Demonstrate how to assist the surgeon during surgery and pass instruments to the surgeon</td>
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<tr>
<td>22. Perform handling of sharps on the surgical field and disposal of sharps (and linen when appropriate)</td>
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<tr>
<td>23. Perform handling and disposal of cytotoxic drugs</td>
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<tr>
<td>24. Perform WHO 'Sign Out'</td>
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</table>

### Comments:

-
-
# Nursing Recovery Room Competency Assessment

**Instructions:**
*Use one form per trainee. For each competency, allocate a score to the trainee's level of execution of said skill: 1 for Novice, 2 for Advanced Beginner, and 3 for Competent. Each skill/competency has notes on what each level should be able to demonstrate.*

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<tr>
<td>Trainee</td>
<td>Does not perform at all</td>
<td>Performs part of, but not all the steps or actions required</td>
<td>Fully performs and demonstrates the skill in line with accepted protocols</td>
<td></td>
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<tr>
<td>Evaluator</td>
<td>(score = 1)</td>
<td>(score = 2)</td>
<td>(score = 3)</td>
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</table>

## Core Competencies

1. Describe the pre-operative patient preparation:
   a. Marking site surgery
   b. Fasting regimes
   c. Management of diabetic/hypertension patients

2. Discuss safe, effective preparation of the recovery area before the commencement of planned operative procedures with regards to:
   a. The patient
   b. The environment
   c. Staff

3. Describe the informed consent process for surgery/procedures

4. Recognize the importance of preoperative checks and safety:
   a. Patient monitoring
   b. Any known allergies

5. Perform ‘Sign In’ pre-operative WHO checklists

6. Describe the monitoring equipment required by each patient in the pre- and post-operative phase and how this should be applied

7. Describe intravenous therapy, intravenous site care, and identified potential complications

8. Recognize the importance that the correct lens/implants are available according to appropriate documentation in patient’s records before patient enters the operating room

9. State the difference between general anesthesia and local anesthesia

10. Perform daily review of the emergency trolley according to policies and procedures

11. Recognize the common anesthetic agents used in the operating room and how they act
## ANNEX I

### Nursing Recovery Room Competency Assessment

<table>
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<td>Does not perform at all</td>
</tr>
<tr>
<td>Evaluator</td>
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</tbody>
</table>

#### Core Competencies

12. Identify the risks for patients recovering from an anesthetic agent

13. Prepare patient bed area for return from operating room, ensuring relevant equipment is available

14. Identify the observations required for patients recovering from anesthesia
   
   **Assess:**
   
   i. state of consciousness
   ii. cardiovascular and respiratory status
   iii. status of the post-op site
   iv. experience of pain
   v. maintenance of airway (including the use of aids, e.g., airways)
   vi. O2 Therapy
   vii. laryngeal mask
   viii. ET tubes

15. Perform documentation of patient vital signs and report in patient chart

16. Discuss the rationale and process for regular post-operative observations and checks, and the process for reporting any problems

17. Manage pain and nausea

18. Discuss pain scoring, the administration of analgesia, and the techniques available to ensure a pain-free post-operative phase

19. Describe link between post-op care and surgery type

20. Articulate discharge criteria, patient education, and documentation

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**Comments:**

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ANNEX I

Pre-Op Patient Care - IV Cannulation Competency

Editors: RN Xiao Ying Liu, RN Gloria Rhoomes, RN Susamma Ebenezer
May 6, 2020

Date: ....................................................... Trainee: ..........................................................
Institution: ................................................ Evaluator: ........................................................ Times on ORBIS project: ................................................

**Competence definition:** The ability of a nurse to integrate & apply the knowledge, skills, judgements, attitudes, values and beliefs required to practice safely and ethically in a designated role or setting. This tool is intended for use in a training environment, either simulated or during surgical practice.

**Instructions for use:** Successful IV Cannulation on a simulated arm following performance criteria below. Clinical supervision by trainer until able to perform IV start independently.

Trainer is required to mark “competent” on trainer’s rate below, if the participant meets the performance criteria for competency, and vice versa, mark “not competent” if the participant does not meet the performance criteria.

<table>
<thead>
<tr>
<th>Core Competency</th>
<th>Performance Criteria</th>
<th>Trainer’s Rate</th>
<th>Comment (why not competent)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patient Education and Assessment</strong></td>
<td>1. Perform WHO “Sign in”. Verify patient’s identity using two identifiers, ensure the correct patient is identified. Required to identify patient’s surname, forename, and date of birth.</td>
<td>Competent</td>
<td></td>
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<tr>
<td></td>
<td>2. Explain the procedure to the patient and obtain verbal/informed consent before commencing procedure.</td>
<td>Not Competent</td>
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<td></td>
<td>3. Inform patient of purpose of IV cannulation, benefits, management, and potential complications.</td>
<td>Competent</td>
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<td></td>
<td>5. Keep patient warm.</td>
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<td>6. Take patients’ baseline observations.</td>
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<tr>
<td><strong>Equipment and Supplies Preparation</strong></td>
<td>1. Ensure all equipment and documentation required for the procedure is on hand before you start to insert the peripheral intravenous cannula. The trolley/work area must be cleaned according to the hospital’s infection control policy.</td>
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<td></td>
<td>2. Trolley/tray</td>
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<td></td>
<td>3. Antiseptic gel/rub</td>
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<td></td>
<td>4. Disposable gloves</td>
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<td></td>
<td>5. Alcohol swabs, gauze, tape to secure the cannula, semi-occlusive or transparent dressing</td>
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<td>6. Tourniquet</td>
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<td></td>
<td>7. Cannula (e.g., 14G – orange, 18G – green, 20G – pink, 22G – blue, 24G – yellow)</td>
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<tr>
<td></td>
<td>8. Selection of appropriate connectors/adapters / IV bungs</td>
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<td>9. Syringe (for saline flush) &amp; sterile sodium chloride for flush</td>
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<td>10. Giving set (adult or pediatric)</td>
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<td>11. Intravenous solution</td>
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<td>12. Sharps bin</td>
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<td></td>
<td>13. Red plastic disposable bag</td>
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</tbody>
</table>
### Annexe I

<table>
<thead>
<tr>
<th>Core Competency</th>
<th>Performance Criteria</th>
<th>Trainer’s Rate</th>
<th>Comment (why not competent)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Preparation prior to IV Cannulation</strong></td>
<td>1. Wash hands</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>2. Check all expiry dates on your equipment/supplies</td>
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<tr>
<td></td>
<td>3. Assemble supplies (IV start kit, IV catheter, T-connector or short extension set, syringe with preservative-free normal saline)</td>
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<td>4. Based on patient age and/or specific situation, select the appropriate cannula (type and size).</td>
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<td></td>
<td>5. Reassure patient and ideally have patient lie down and relax. In case of a small child, use a blanket to wrap both arms and have patient’s parent hold them in his/her lap with “back to chest position.” (child’s back face parents’ chest)</td>
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<td>6. Don exam gloves</td>
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</tr>
<tr>
<td><strong>Assessment / Selection of Vein</strong></td>
<td>1. Consider specific patient condition/history as well as patient comfort, age, mental status and activity level in vein selection. Demonstrate knowledge of injury/disease that may prevent use of an extremity (e.g. mastectomy, dialysis shunt, infection, trauma, etc.)</td>
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<td>2. Assess condition, stability, depth and size of veins and differentiate from artery</td>
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<td>3. Remove excess hair from insertion site with scissors, if indicated. DO NOT shave.</td>
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<td>4. Effectively assess veins by visual inspection, palpation</td>
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<td>5. Effectively distend veins (tourniquet, make fist, arm dependent, etc.)</td>
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<td></td>
<td>6. Choose appropriate vein (cannula size is determined by condition of vein) in order of preference (hand and lower arm, upper arm, antecubital fossa, and foot/ankle). Ensure freedom of movement. On FEH, right arm is preferred due to position of the anesthesia.</td>
<td></td>
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</tr>
<tr>
<td><strong>Insertion of Cannula Site: Secure IV Catheter</strong></td>
<td>1. Apply tourniquet above intended cannulation site</td>
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<td>2. Cleanse skin with alcohol swab using back-and-forth scrubbing motion and allow to dry.</td>
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<td>3. Stabilize vein below intended cannulation site with non-dominant hand.</td>
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<td>4. Insert cannula bevel-up, through skin, at approximately 30-degree angle. Observe for blood return within flashback chamber.</td>
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<td>5. Lower angle of insertion to approximately 15 degrees and continue to advance catheter into vein.</td>
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<td>6. Holding stylet steady, push catheter off stylet and into vein until catheter hub is situated against the skin.</td>
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<td>7. Release tourniquet.</td>
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<td></td>
<td>8. Occlude tip of catheter by pressing fingers of non-dominant hand over approximate vein pathway to prevent retrograde bleeding.</td>
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<td></td>
<td>9. Remove stylet/or press the white bottom to engage safety mechanism, e.g. BD Insyte Autoguard needle will retract and fully encapsulate.</td>
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<td>10. Dispose of needle in sharps container</td>
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<tr>
<td></td>
<td>11. Put on IV bung or connect IV fluid as per requirement</td>
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<td></td>
<td>12. Dress IV site with transparent IV dressing. Secure IV catheter with sterile stabilization device for child if needed.</td>
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<td>13. Perform hand hygiene</td>
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<td>14. If unsuccessful after 2 attempts, consider referring to another competent health care worker to carry out procedure</td>
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<tr>
<td></td>
<td>15. Sterile connection of t-connector or extension tubing to IV cannula as per anesthesiologist preference</td>
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<td></td>
</tr>
<tr>
<td><strong>Complete Patient Record</strong></td>
<td>1. Record the date, time and the name of the person carrying out the cannulation procedure in EMR Pre-op Patient Record</td>
<td></td>
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<tr>
<td></td>
<td>2. Document type of cannula/site used for this procedure, type of fluid, and infusion rate if applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Compliance of Infection Control Policy</strong></td>
<td>1. Adhere to WHO - 5 Moments for Hand Hygiene throughout the procedure</td>
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</tr>
<tr>
<td></td>
<td>2. The same needle must never be re-inserted when cannulation is unsuccessful.</td>
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<tr>
<td></td>
<td>3. If any blood spillage occurs the nurse/delegated person should clean up the spillage in accordance with FEH infection control policies.</td>
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</tbody>
</table>
## Nursing Sub-Sterile Competency Assessment

**Instructions:**
Use one form per trainee. For each competency, allocate a score to the trainee's level of execution of said skill:
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### Core Competencies

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</table>

1. State the differences among steam, gas, and cold sterilization procedures
2. Describe the care and handling process of ophthalmic microsurgical instrument
3. Identify instrument cleaning methods that can prevent Toxic Anterior Segment Syndrome (TASS) and endophthalmitis
4. Demonstrate knowledge on all processes related to cleaning & sterilization, including but not limited to:
   a. Manual cleaning
   b. Use of machine washer
   c. Application of ultrasound cleaner
   d. Articulate why lubrication is important to the care of ophthalmic instruments
   e. Identify necessary characteristics of packaging systems
5. Describe classifications of chemical indicators
   a. Demonstrate successful sterilization process, which meet the parameters of sterilization
   b. Perform biological testing to demonstrate that all microorganisms, including spores, have been killed
6. Describe sterilization monitoring method and quality control
7. Describe conditions necessary for storage of sterilized items
8. Recognize the term 'Event Related Sterility'
9. Demonstrate knowledge on and perform instrument processing cycle:
   a. decontamination and cleaning
   b. inspection and assembly
   c. packing
   d. sterilization and quality control
   e. storage
   f. handling
   g. use of patient
   h. return

### Comments:
ANNEX K

BLS Examination

Basic Life Support Examination

1. **What is the rate for performing chest compressions for a victim of any age?**
   - A. 30 compressions per minute
   - B. 50 compressions per minute
   - C. 80 compressions per minute
   - D. 100 to 120 compressions per minute

2. **Which of the following describes a way you can allow the chest to recoil completely after each chest compression?**
   - A. Keep the chest pushed down approximately 1/2 to 1 inch between compressions
   - B. Keep your weight on the victim's chest so the chest is slightly compressed at all times
   - C. Compress the chest shallowly with each compression so you don't have to release too far
   - D. Take your weight off your hands and allow the chest to come back to its normal position

3. **What is the BEST way for a rescuer to know that a rescue breath for an infant victim is effective?**
   - A. The stomach rises visibly
   - B. The chest rises visibly
   - C. An adult ventilation bag is completely compressed
   - D. The rescuer can hear an air leak around the mask

4. **How do you know when to start cycles of chest compressions with breaths for an adult?**
   - A. The victim has a pulse but is having trouble breathing
   - B. The victim is responsive but is complaining of chest pains and indigestion
   - C. The victim is unresponsive, is not breathing, and does not have a pulse
   - D. The victim is unresponsive but is breathing adequately

5. **Which of the following statements tells why it is important to give early defibrillation to an adult?**
   - A. The most frequent initial rhythm in witnessed sudden cardiac arrest is atrial fibrillation
   - B. Rapid defibrillation in combination with high-quality CPR can double or triple the chances of survival
   - C. The probability of successful defibrillation diminishes rapidly over time
   - D. Ventricular fibrillation is an uncommon cause of sudden cardiac arrest in adults

6. **After you power on an AED and attach the pads to the victim, what is the next step you should do?**
   - A. Clear the victim so the AED can analyze the heart rhythm
   - B. Press the SHOCK button immediately
   - C. Clear the victim and press the SHOCK button
   - D. Give another cycle of CPR before pressing the analyze button
ANNEX K

7. What might happen if you touch the victim while the AED is delivering a shock?
   A. The AED will power off if you touch the victim while it is shocking
   B. You might move the victim, which may cause the AED to reanalyze the victim’s rhythm
   C. The AED could shock you while it is shocking the victim
   D. The AED might mistake your movement for the victim’s pulse and not deliver a shock

8. What is the BEST way to relieve severe choking in a responsive adult?
   A. Perform abdominal thrusts
   B. Start CPR immediately
   C. Give 5 back slaps, followed by 2 breaths
   D. Give 2 breaths, repositioning the airway after each breath

9. What is the BEST action to relieve severe choking in a responsive infant?
   A. Kneel behind the infant and perform abdominal thrusts (perform the Heimlich maneuver)
   B. Begin cycles of 5 back slaps, followed by 5 chest thrusts
   C. Give 2 breaths, repositioning the airway after each breath
   D. Start CPR immediately

10. Which of the following statements BEST describes why you should minimize interruptions when giving chest
    compressions to any victim of cardiac arrest?
    A. You do not need to worry about interrupting chest compressions
    B. Minimizing interruptions means you will not be as tired giving CPR
    C. Only advanced care professional need to worry about minimizing interruptions
    D. If you minimize interruptions in chest compressions, you will increase the victim’s chances of survival

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**ANSWER KEY**

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ANNEX L

Anesthesia Simulation Training (Example One)

Name: ___________________________ Date: ___________________________

Orbis Perioperative Safety Simulation Training Program
Pediatric Anesthesia
FEH Mobile Simulation Center

The program is designed to provide an intensive, immersive one-day experience for two trainees per day. The overall goals at the completion of the program are for the trainees to understand and be able to put into practice basic safety principles applied to perioperative care, to ensure a safe environment for surgical care, and to provide a foundation for their personal development relevant to the management of critical events during pediatric ophthalmic surgery.

Morning session 09.30 – 12.00 (Total Time 2.5 Hours)

The morning session is devoted to providing the trainees with an understanding of the basic principles of patient safety as follows:

Session One: Introduction to the Orbis Anesthesia Simulation Program
1. Walk through the Flying Eye Hospital (FEH), including safety briefing
2. Introduction to Orbis OR and Recovery Room
3. Orientation to OR and Anesthesia Workstation:
   a. Safety Checklist
   b. Safety features of the Anesthesia Workstation
   c. Medical gas system and emergency backup systems
   d. Electrical systems and emergency backup supply
4. Orientation to Laerdal® Megacode Kid manikin

Session Two: Stepwise walk-through a standard ophthalmic general anesthetic on PediaSIM:
1. Workspace setup, equipment orientation, and ergonomics
2. Drugs and equipment setup
3. Use of LMA vs. ETT for airway management
4. Correct and efficient procedural techniques
5. Something goes wrong – review PALS scenario
6. Difficult airway guidelines, emergency airway aids and use of the video laryngoscope on neonate Pierre-Robin manikin, infant airway manikin, adult trauma care manikin

Session Three: Visit to Flight Deck (coordinated with Chief Aircraft Mechanic)
Review aviation safety principles and processes (checklists, system redundancy and backup systems, communication principles, etc). This exercise relates aviation safety principles to anesthesia patient safety, and has proven to be a rewarding and unique element of the FEH Anesthesia Simulation Program and a stimulus to learning.
The afternoon session is devoted to providing a realistic clinical experience for the trainees. In the simulated patient case, the trainees will provide anesthetic care to an infant scheduled for elective ophthalmic surgery. The participants will work cooperatively together as a team with each taking turns to act as team leader during the Simulated Clinical Experience (SCE). The plan is to conduct four SCEs per session as time permits.

**Each SCE will follow the format of:**
1. Pre-operative Brief – patient pre-operative assessment and planned procedure
2. The trainee is expected to develop an anesthetic plan
3. The trainee, working with their assistant, will execute anesthesia plan
4. “Clinical Event”
5. Team Debrief

**Session Four: Simulated Clinical Experiences (SCE):**
1. Scenario: Anaphylaxis
2. Scenario: Intraoperative Bradycardia
3. Scenario: Oxygen Failure in the Operation Room
4. Scenario: Cardiac Arrest in the Operation Room
5. Scenario: Difficult Intubation
6. Scenario: Acute Bronchospasm
7. Scenario: Acute Laryngospasm/Hypoxia
8. Scenario: Local Anesthetic Toxicity

**Feedback Session:** The program will conclude with a wrap-up wherein we will seek the opinions of the participants and their thoughts on the day’s training, and address any outstanding issues and suggestions for program improvement.
### Annexe M

**Anesthesia Simulation Training (Example Two)**

<table>
<thead>
<tr>
<th>Sample Schedule – Anesthesia Emergencies Simulation Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>08.00</td>
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<tr>
<td>08.30</td>
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</tbody>
</table>
| 09.00 – 10.15 | **Short presentations: Round 1**  
1. Cardiac arrest  
2. Anaphylaxis  
3. Laryngospasm  
4. Pediatric Airway Evaluation  
5. LA toxicity |
| 10.15 – 10.30 | Coffee Break |
| 10.30 – 12.30 | **Simulated Scenarios & Skill Stations: Round 1** |
| 12.30 – 13.15 | Lunch |
| 13.15 – 14.30 | **Short presentations: Round 2**  
6. Difficult Airway Guidelines  
7. Cannot intubate/cannot ventilate  
8. Pediatric ENT  
9. Airway fires/power failure  
10. Pediatric Intraoperative Arrythmia |
| 14.30 – 16.30 | **Simulated Scenarios & Skill Stations: Round 2** |
| 16.30 – 16.45 | Feedback & Quiz |

**Simulation Symposium**

1. **Manikin Scenario:** Anaphylaxis Group A
2. **Skill Station:** Adult Airway Group B
3. CPR Manikin: Adult Algorithm Group C
4. **Skill Station:** ORSIM Fiberoptic Group D
5. **Manikin Scenario:** LA toxicity - Pediatric CPR Group A
6. **Skill Station:** Cricothyrotomy Group B
7. **Conflict Resolution** Group C
8. **Skill Station:** Pediatric Airway Group D
## ANNEX M

### Manikin Scenario 1: Anaphylaxis

7yo, ASA 1, 22kg for strabismus

| Cannula in-situ |  
| Pre-O2 |  
| HR = 92 SR; BP = 115/75; SpO₂ = 99% |  
| IV induction propofol/fentanyl/atropine |  
| LMA 2.5 sited |  
| Maintenance with sevoflurane 2% in 50% O₂ & air |  
| Surgeon asks for antibiotic & muscle relaxant to centralize the eye |  
| **After 1 minute:** HR = 140 |  
| **After 2 mins:** HR = 155; BP = 70/45; SpO₂ +95% |  
| **After 3 mins:** HR = 50; BP = 50/~; SpO₂ = 89%; wheeze/↑ AWP |  

**Debrief - Look for:**
- Stop surgery; call for help
- Head down, increase IV fluids 20ml/kg
- Early epinephrine 10mcg/kg repeat every 3-5 mins
- Consider: antihistamine; steroid
- IV infusion epinephrine
- Blood tests
- Cancel surgery; transfer to ITU

### Manikin Scenario 2: LA toxicity & cardiac arrest

7yo, ASA 1, 22kg for enucleation

| Cannula in-situ |  
| Pre-O2 |  
| HR = 92 SR; BP = 115/75; SpO₂ = 99% |  
| IV induction propofol/fentanyl/atropine |  
| LMA 2.5 sited |  
| Maintenance with sevoflurane 2% in 50% O₂ & air |  
| Surgeon places RBB with 32mm, 25G needle – 5mls 0.75% bupivacaine |  
| After 0.5 mins multiple VE |  
| **After 1 min:** runs of VT – ↑BP 70/45 |  
| **After 2 mins:** VT with BP 50/30 |  
| **After 3 mins:** VF |  

**Debrief - Look for:**
- Recognize VEs and plans ahead with emergency drugs and equipment
- Use & Dose of Intralipid
- High FiO₂ reduces then stops Sevo
- Commences CPR when VT with low BP
- Calls for help
- Continues CPR longer
- Gives epinephrine and amiodarone appropriately
ANNUX N

Anesthesia Skills Examination

Sample Post-Simulation Training Exam: Anesthesia Emergencies

1. What charge is used to defibrillate a child in VF (J/kg)?

2. What four (4) rhythms are associated with cardiac arrest?

3. What is the incidence of perioperative anaphylaxis?

4. What initial IV dose of which drug would you use to manage anaphylaxis?

5. Name four (4) risk factors for laryngospasm during induction of anesthesia?

6. What anatomical point is pressed to release laryngospasm?

7. Name three (3) anatomical features that make pediatric laryngoscopy difficult:

8. Name three (3) syndromes associated with a high risk of difficulties intubating the trachea:

9. What is the recommended maximum volume of bupivacaine 0.5% in a 20kg child undergoing caudal anesthesia?

10. What initial dose of what drug would you administer to reverse suspected LA toxicity in this same child?

11. What is the maximum number of attempts at tracheal intubation that should be made before abandoning further attempts?

12. How many attempts to insert an LMA as a rescue airway after failed tracheal intubation is appropriate?

13. What specific anatomical area do we access when establishing FONA (Front Of Neck Airway)?

14. How long should a surgical FONA take to establish in an emergency?

15. In a child with a symptomatic URI, for how long should routine surgery be postponed as a minimum?

16. Name three (3) signs & symptoms of Obstructive Sleep Apnea (OSA) in a child?

17. In the event of an airway fire, what are your first two (2) priorities?

18. Name two (2) safety measures that should always be in place in the OR to protect your patient in the event of a complete power failure to the operating room:

19. What afferent and efferent nerves are involved in the oculo-cardiac reflex?

20. What dose of what drug may be used to prevent this reflex?
**Annex N**

**Answer Key**

1. 4J
2. VF; pulseless VT; asystole; pulseless electrical activity
3. 1 in 10,000
4. 1 mcg/kg
5. Light anesthesia; junior anesthetist; recent URTI; 2+ parents who smoke; history of asthma/atopy; nocturnal cough; use of ETT rather than LMA
6. Larson's point
7. Large head/occiput; short neck; large tongue; high anterior larynx; adeno-tonsillar hypertrophy; large floppy epiglottis
8. Down's; Treacher-Collins; Goldenhar; Pierre-Robin; Hurler's; Hunter's
9. 8ml
10. 20% lipid emulsion (Intralipid) – 1.5ml/kg
11. 3 (+1 by senior expert)
12. 3
13. Cricothyroid membrane
14. Less than 3 or 4 minutes
15. Minimum 2 weeks
16. Obesity; adeno-tonsillar hypertrophy; snoring; daytime somnolence; failure to thrive; poor school performance; developmental delay; behavioural disturbance
17. Stop procedure - Remove fuel source (ETT) - Remove oxygen
18. Battery back-up monitor & machine; Ambu bag; Emergency lighting; Generator back-up; UPS for essential surgical equipment
19. Trigeminal (long ciliary) & Vagus
20. Anti-muscarinic atropine (20 mck/kg) or glycopyrrolate (10 mcg/kg)
## Sample Debriefing Script

<table>
<thead>
<tr>
<th>Phase</th>
<th>Inquiry/Script</th>
<th>Time</th>
<th>Notes made during simulation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Introductions</strong></td>
<td><strong>Facilitator:</strong> We are going to debrief together for about X minutes. During this time, I would like you to reflect on the scenario you just completed and, most importantly, I would like everyone to participate in the discussion. My role is to help facilitate, but not dominate the discussion. Before we begin, we should acknowledge that this was a simulation, and we may have acted differently in real life. Now, let's focus our discussion on our team interactions and the process of care delivered to the patient.</td>
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</tbody>
</table>
| **Reactions**                 | **Facilitator:** How are you feeling now that it's all over?  
**Facilitator:** Great, other thoughts? Let's talk about how you addressed issues around communication during the scenario. |      |                              |
| **Understanding phase: CRM**  | **Facilitator:** First, let's talk about how the team worked together. Let's discuss how your group divided up the roles during the code. What went well, and what didn't go so well?  
**Facilitator:** Great, let's move on to discussing the medical management. |      |                              |
| **Understanding phase: Medical Managements** | **Facilitator:** Participant #1, you were the code leader. Why don't you walk us through your thought process around the medical management of this patient? Let's talk about your assessment of the ABCs. What went well, and what didn't go well? |      |                              |
| **Summary phase**            | **Facilitator:** So, to conclude, let's identify the key learning points from the scenario.  
*[To the group]* What would you say are the two or three main take-home messages from the scenario?  
*[Or, individually]* Let's go around and have each of you describe your main take-home messages from the scenario. |      |                              |

*Created by the Children’s Hospital of Philadelphia: The Center for Simulation, Advanced Education, and Innovation*
# Sample Logbook

<table>
<thead>
<tr>
<th>Year of Study</th>
<th>Date</th>
<th>Time In</th>
<th>Time Out</th>
<th>Activities Covered</th>
<th>Faculty Signature</th>
<th>Observations</th>
</tr>
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</table>
## Recommendation for Simulation Instructor Professional Development

**Comprehensive Instructor Workshops:** There are many courses; a few are listed below.

<table>
<thead>
<tr>
<th>Center for Medical Simulation Harvard</th>
</tr>
</thead>
<tbody>
<tr>
<td>• This five-day intensive immersion in healthcare simulation is led by experienced simulation educators, and covers all high-level elements and concepts involved in running a simulation program. Daily formats vary and include simulation scenarios, lectures, small and large group discussions, case studies, and practical exercises with feedback.</td>
</tr>
<tr>
<td>• CME offered 40 +</td>
</tr>
<tr>
<td>• Application required</td>
</tr>
<tr>
<td>• Fee +</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Penn State Milton Hershey Medical Center</th>
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</thead>
<tbody>
<tr>
<td>• This five-day, highly interactive certificate course features a multi-disciplinary faculty who teach participants how to combine simulation with traditional methodologies, apply assessment tools, and choose among various simulation modalities for specific applications. The course provides a practical framework in learning theory, group dynamics, and psychology of the learner, focusing on debriefing skills</td>
</tr>
<tr>
<td>• CME offered 40 +</td>
</tr>
<tr>
<td>• Application required</td>
</tr>
<tr>
<td>• Fee +</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Stanford</th>
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<tbody>
<tr>
<td>• The Stanford Center for Immersive and Simulation-based Learning Simulation Instructor Course is a two-day interactive primer for novice and intermediate instructors, as well as individuals who are currently using or plan to use immersive and simulation-based learning techniques in their teaching. Enrolled participants will have the opportunity to design, develop, and implement their own simulation scenarios in small groups, followed by practice debriefing skills and techniques with direct feedback and coaching from CISL experts.</td>
</tr>
<tr>
<td>• No CME</td>
</tr>
<tr>
<td>• No application</td>
</tr>
<tr>
<td>• Fee</td>
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</table>

<table>
<thead>
<tr>
<th>Wiser</th>
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<tbody>
<tr>
<td>• This three-day, internationally renowned program, created in collaborative effort between Wiser at the University of Pittsburgh and the Gordon Center for Research in Medical Education at the University of Miami, is designed as an introduction to fundamental skills and abilities for delivering simulation-based healthcare education through a variety of techniques and technologies. The program emphasizes hands-on activities and active participation to maximize simulation-based instruction skill acquisition. Class group sizes are kept small to allow for maximum participation. The primary audience for this course are healthcare educators wishing to improve their skills as instructors in simulation education.</td>
</tr>
<tr>
<td>• CME offered</td>
</tr>
<tr>
<td>• No application</td>
</tr>
<tr>
<td>• Fee</td>
</tr>
</tbody>
</table>
Suggested Simulation Societies/Places to Get Involved

**Society for Simulation in Healthcare**
Benny Joyner - Pediatric Section Chair, MD | Scott Watkins - Anesthesiology Section Chair, MD
A leading interprofessional society that advances the application of simulation in healthcare through global engagement.

**Simulation Education Network (SEN)**
A network of ASA-endorsed simulation programs held in centers across the country to deliver training to anesthesiologists. Courses are designed to realistically recreate challenging clinical cases to allow participants to problem-solve in a manner that is similar to actual clinical experience.

**Simulation Interest Group Subgroup of Society of Pediatric Anesthesia**
David A. Young, Chair, MD, MEd, MBA
This is a group of pediatric anesthesiologists who are actively involved in simulation education and are collectively working on furthering simulation in the field of pediatric anesthesia through the exchange of ideas.

**Society of Education in Anesthesia Simulation Committee**
They offer simulation-based educational workshops at the SEA (as well as ASA and International Meeting of Simulation in Healthcare) on a variety of topics to develop educators and prepare them for success in simulation-based education.

**The International Pediatric Simulation Society (IPSS)**
The Society was established to promote and support multidisciplinary simulation-based education, training, and research in all subspecialties that care for infants and children. They organize an annual meeting that brings together leaders in the field of pediatric simulation with educators, researchers, and patient safety experts. The meeting – IPSSW – provides an opportunity to expand horizons, cross-fertilize ideas and promote excellence in education and investigative research. The annual meeting is in the Spring.

**International Network for Simulation-based Pediatric Innovation, Research, & Education (INSPIRE)**

**Pediatric Anesthesiology Fellowship Boot Camps (example sites)**
Multi-institutional faculty gather to provide simulation-based education in the form of skill stations and scenarios. Scenarios are targeted at engaging fellows in employing CRM principles in critical situations. Held at varied times and with minimal fees for participation.

- CHOP - Devika Singh and Harshad Gurnaey
- Johns Hopkins - Dolores Njoku and Shivani Patel
- UNC/Duke – Kimberly Blasius
- Wisconsin Children's - Chelsea Willie
ANNEX Q

TEAM STEPPS (Strategies and Tools to Enhance Performance and Patient Safety)

- Developed by the Department of Justice
- Designed to improve quality, safety and the efficiency of health care
- Based on 25 years of research related to teamwork, team training, and cultural change
- Two-day training course
- Train-the-trainer approach

At the core of the National Implementation are five Regional Training Centers:
2. MetroHealth; Cleveland, Ohio.
3. Duke Medical Center; Durham, North Carolina.
5. University of California; Los Angeles, California.

These centers offer Master Training courses to create a national network of Master Trainers, who will in turn offer TeamSTEPPS training to frontline providers in hospitals and other health care settings throughout the country. The TeamSTEPPS Master Training course is geared toward individuals who are looking to implement TeamSTEPPS at their facility.
Orbis MSICS Wet Lab Course Outline
ANNEX R

Wet Lab Course Outline: Manual Small Incision Cataract Surgery (MSICS)

Author: Katie Hallahan, MD, Global Blindness Prevention And International Ophthalmology Fellow
Editor: Amelia Geary, Director Program Development & Quality
July 2017

Introduction

Orbis International is a non-profit organization dedicated to eye care for all through strengthening healthcare systems and building institutional capacity to prevent and treat preventable blindness. Since 1982, Orbis has provided practical hands-on surgical and clinical training for eye care professionals worldwide.

Orbis training and education is delivered through:

1. The Orbis Flying Eye Hospital (FEH), a state of the art surgical and training facility accredited through the American Association for Accreditation as an Ambulatory Surgery Facilities International (AAAASFI).
2. Hospital Based Trainings (HBT). Training is conducted for eye care professionals within their own practice setting by global ophthalmic experts.
3. Cybersight, a patient care consultation and online education program that extends the presence of Volunteer Faculty (VF).

At the core of all Orbis training programs is our comprehensive and diverse global cadre of over 400 Volunteer Faculty, providing ophthalmic education and instruction to increase our partners’ skill, service, and the quality of patient care. Our global cadre is comprised of experts from all ophthalmic subspecialties and disciplines.

Today, Orbis regularly delivers training in 19 countries where we have established multi-year projects, as well as short training courses through the Flying Eye Hospital and hospital-based trainings in Asia, Africa, and Latin America.

Course Objective

This course is designed to provide wet lab training in Manual Small Incision Cataract Surgery (MSICS) for residents and junior ophthalmologists.

MSICS has been recognized worldwide as a viable alternative to phacoemulsification for cataract surgery in resource constrained areas. It also serves as a valuable intermediary step to mastering phacoemulsification surgery.

This course includes the following aims:

1. Knowing and performing all surgical steps of MSICS (Figure 1)
   - Conjunctival peritomy
   - Scleral tunnel
   - Capsulorhexis (continuous curvilinear, can-opener, and “V”)
   - Hydrodissection
   - Nucleus extraction
   - Cortex removal
   - Intraocular lens insertion
   - Irrigation/aspiration
ANNEX R

2. Identifying key microsurgical instruments and supplies
3. Managing common intraoperative complications
   • Poor wound construction
   • Anterior chamber instability
   • Capsular tears
   • Vitreous loss
4. Proper suturing techniques and knots (3-1-1, slip knot, figure of eight)
5. Pre-operative cataract evaluation and documentation
6. Patient consent process

---

**Wet Lab: Learning MSICS Step by Step**

- Preparation of the Eye
  - Use of microscope
  - Proper betadine
  - Lid speculum
  - Traction suture
- Paracentesis & Viscoelastic
- Anterior Capsulorhexis, Options:
  - Can opener
  - CCC (While not essential for SICS, CCC greatly adds to surgical safety, less PC breaks, and efficacy; it is also the pre-requisite for learning phacoemulsification, so should be included in training.)
- Wound Construction
  - Conjunctival incision
  - Cauterizing the epi-sclera
  - Scleral tunnel formation
- Anterior Chamber Maintainer (ACM)
- Hydrodissection & Expression (of the lens out of the capsular bag)
- Extracapsular Technique: Expression of Lens out of the Eye. Options include:
  - A glide & hydroexpression
  - Irrigating Vectis technique
  - Simcoe Cannula technique
  - Plain Vectis technique
- Cortical Cleanup
- IOL Insertion & Implantation
- Wound Inspection & Closure
  - Includes scleral wound (possible need to suture)
  - Conjunctiva

*Figure 1: Steps of MSICS*
ANNEX R

Course Application and Duration

This course can be effectively delivered by Orbis International in one week on-site, ideally in the context of the Orbis MSICS Training Course, which includes continual tele-education and a six-week on-site program.

This course was designed for Orbis projects with any of the following objectives:

1. Strengthening residency training
2. Training secondary or rural eye care professionals in cataract surgery
3. Training ophthalmologists in low resource areas, in which phacoemulsification machines and consumables are not available.

Target Audience

Intermediate-level and senior resident ophthalmologists who will be participating in MSICS procedures within one year would benefit most from this course. However, should time and space allow, junior residents would also find value in participation. Surgeons who perform conventional extracapsular cataract extraction and wish to learn the skills to perform MSICS are also appropriate course members.

Training Ratios

Ideally, the course will have one trainee per wet lab station per half-day, where a wet lab station includes a surgical microscope and necessary microsurgical instruments. For example, if the host facility has a total of four wet lab stations, the ideal ratio of trainees to trainers will be 8:1 (or two trainers, if available). If the host facility has a total of three wet lab stations, the ratio would be six trainees to one to two trainers, and so on.

To expand the number of trainees, one could consider creating an additional gross knot-tying station or an VRMagic Eyesi® surgical simulator training station, if available. The addition of these stations could effectively allow for up to four more trainees.

Format

All trainees shall receive the “key lectures” as a group. Then, trainees will be split into two groups in order to accommodate twice as many trainees as there are wet lab stations at the host facility. For example, if the host facility has a total of four wet lab stations, up to eight trainees may participate. They will be split into two groups of four. All eight trainees and any other interested ophthalmologists shall attend the key morning lectures. Then, one group of four will have hands-on wet lab training in the morning, and the other group will have their hands-on wet lab training in the afternoon. This allows for each trainee to have their own microscope and wet lab station for a dedicated three hours of hands-on surgical practice per day.
Criteria for Trainer or Mentor

The ideal main trainer (referred to as Trainer A in this course outline):

✔ Is at minimum a fellow, but ideally a staff ophthalmologist with MSICS experience, who is involved in a residency program and can easily articulate technical maneuvers to beginner ophthalmologists.
✔ Has experience performing MSICS and is comfortable with all steps.
✔ Has experience teaching residents and beginners who may have little to no surgical experience.
✔ Is able to provide interactive lectures and hands-on instruction in the wet lab.
✔ Has the ability to do simple troubleshooting with wet lab equipment (e.g., microscopes).
✔ Is a flexible problem-solver if resources or infrastructure fails (e.g., back-up plans for teaching and practicing if the generator fails and there is a black out).

The ideal supporting trainer (referred to as Trainer B in this course outline) doesn’t require the same level of experience, but should be at least a senior resident and have sufficient experience to deliver the additional lectures and help out Trainer A in lab.

Please see the following suggested schedule:

<table>
<thead>
<tr>
<th>Suggested Schedule</th>
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<tbody>
<tr>
<td><strong>Day 1</strong></td>
</tr>
<tr>
<td>8AM - 10AM</td>
</tr>
<tr>
<td>10AM - 1PM</td>
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<tr>
<td>1PM - 2PM</td>
</tr>
<tr>
<td>2PM - 5PM</td>
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</table>

Lunch
ANNEX R

Lecture Topics and Objectives

“Key Lectures” shall be presented to all trainees. The “Additional Lectures” are suggested topics, time permitting or if a second trainer is available.

Lectures on surgical steps and technique should include video for optimal training.

Key Lectures

Lecture I: Overview of MSICS Steps and Detailed Technique/Tips for Conjunctival Peritomy and Scleral Tunnels

By the completion of the lecture, trainees should be able to:

- Name and describe all steps of the MSICS procedure
- Describe the instruments needed, location, and preferred technique for conjunctival peritomy and creation of the scleral tunnel
- Describe how to prevent and manage poor hemostasis, premature entry, shallow wounds, and button-holes.

Lecture II: Detailed Technique/Tips for Paracentesis, Entering the Main Wound, Viscoelastic Insertion, and Anterior Chamber Maintainers

By the completion of the lecture, trainees should be able to:

- Describe instruments needed, location, and preferred technique for creation of the paracentesis, entrance of the main wound, viscoelastic insertion, and use of anterior chamber maintainers
- Be aware of the importance of the angle and location of the paracentesis
- Describe different types of viscoelastic (cohesive, dispersive, dual) and when they should be used
- Be aware of the Blumenthal technique and optional use of an anterior chamber maintainer.

Lecture III: Suture Technique, Knots, and Approaching Corneal Laceration Repair

By the completion of the lecture, trainees should be able to:

- Describe the preferred technique for corneal and scleral suturing with special focus on loading the needle under the microscope, the location of the needle in the forceps, handling of tissue, angle of needle entry and exit, preferred length and depth of sutures
- Describe the throws and when to use 3-1-1, slip, and figure-of-eight knots
- Name types of suture (braided vs monofilament, dissolvable vs permanent, prolene, nylon, vicryl, plain gut, gortex), describe their purpose, and give examples of their use
- Name types of needles (spatulated vs cutting, curved vs straight), describe their purpose, and give examples of their use
- Be aware of how to approach corneal and scleral laceration repairs in straight, jagged, or stellate configurations.

Lecture IV: Detailed Technique/Tips for Anterior Capsulorhexis, Hydrodissection, and Nucleus Extraction

By the completion of the lecture, trainees should be able to:

- Describe the preferred method for the creation of a continuous curvilinear capsulorhexis, can-opener capsulotomy, and V capsulotomy
- Describe the advantages and disadvantages for each type of capsulorhexis
- Understand basic vector forces when creating a capsulorhexis
- Describe proper technique for hydrodissection
- Describe the various methods for nucleus extraction including use of viscoelastic, irrigating and non-irrigating vectus, irrigation with cannula, and Simcoe irrigation.
Lecture V: Detailed Technique/Tips for Cortex Removal, IOL insertion, Irrigation/Aspiration, Closure

By the completion of the lecture, trainees should be able to:

• Understand the fluidics of irrigation/aspiration with the Simcoe
• Describe the technique for cortex removal and viscoelastic removal
• Describe the technique for handling, insertion, and proper placement of an intraocular lens
• Understand the importance of proper IOL placement and describe the possible complications associated with poor or incorrect placement
• Describe the basic types of IOLs by location and material
• Describe how to check for stable wound closure at the end of the case
• Describe the options for conjunctival closure (pull into place, cautery, suture).

Lecture VI: Management of Common Complications

By the completion of the lecture, trainees should be able to:

• Understand how to avoid and manage capsulorhexis rents with techniques such as the Little Maneuver
• Understand how to avoid and manage vitreous loss
• Understand basic anterior vitrectomy
• Describe when, if, and where to place an IOL in the case of anterior capsular tear or vitreous loss and how to choose the lens type and power.

Lecture A: Surgical Microscope Basics and MSICS Surgical Instruments

By the completion of the lecture, trainees should be able to:

• Place themselves in a comfortable and ergonomic position at the surgical microscope
• Know their pupillary distance
• Know how to focus, zoom, X-Y, and center their surgical microscopes manually and with the foot pedals
• Be able to name and visually identify the surgical instruments needed for MSICS and describe their use
• Understand how to properly care for wet lab instruments.

Additional Lectures

Lecture B: Biometry and IOL Selection

By the completion of the lecture, trainees should be able to:

• Understand the basic lens formulas and understand the theory behind them
• Understand and be able to perform A scans and keratometry by multiple methods
• Troubleshoot and perform quality control with IOL selection (e.g., comparing the axial length of both eyes, checking the target refraction, checking for appropriate lens formula)
• Describe different types of lens choices (acrylic, PMMA, foldable, one piece, three piece, anterior chamber IOLs) and when to use each type
• Identify the A constant and how to account for this in IOL selection.
Lecture C: Patient Consent and Key Documentation Items

By the completion of the lecture, trainees should be able to:

• Communicate with their patients the key points of surgery and articulate in layman’s terms the risks, benefits, alternatives, and complications associated with surgery
• Understand the importance of patient consent and establishing expectations
• Know what key items to include in their pre-operative documentation (e.g., laterality, current refraction, target refraction, surgical plan, history of trauma or previous surgery, comorbidities such as glaucoma or pseudoexfoliation, special needs, plan for contralateral eye).

Lecture D: Management of Complex Cataracts

By the completion of the lecture, trainees should be able to:

• Know how to plan and manage surgery in white cataracts
• Understand maneuvers to prevent an “Argentinean flag sign”
• Know how to plan and manage surgery in traumatic cataracts
• Know how to plan and manage surgery in cataracts with zonular loss or history of pseudoexfoliation.

Wet Lab Station Set-up

Each wet lab station should be outfitted with the following equipment each day:

• Clean workspace
• Disposable gloves in small, medium, and large – ideally, non-latex to avoid allergic reactions.
• Paper towels
• Water and detergent to clean instruments- ideally, distilled water to prevent rusting.
• Piece of Styrofoam and 3-4 pins to mount the practice eye (These are reusable.)
• Chair- ideally one that adjusts in height
• Surgical microscope
• Instrument kit that includes the following:
  ◦ Blunt Wescott Scissors (1)
  ◦ 0.12 toothed forceps (1)
  ◦ Utrata forceps (1)
  ◦ Mosquito hemostat (1)
  ◦ Hydrodissection cannula, 22G or 25G (1)
  ◦ 5cc syringe (2)
  ◦ 1cc syringe (1)
  ◦ Sinsky hook (1)
  ◦ Simcoe with tubing (1)
  ◦ Vectus (irrigating or non-irrigating, 1)
  ◦ Tying forceps (2)
  ◦ Anterior chamber maintainer with tubing (1)
  ◦ Microsurgical needle driver (1)
  ◦ Lens insertion forceps (optional, 1)
  ◦ 10cc syringes (2 for AM session, 2 for PM session for injecting the vitreous if eyes are too soft, may be used for the week)
ANNEX R

Wet Lab Daily Objectives and Additional Supplies

**Day 1: Wound Construction**

*Objectives:*
- Completion of 4-8 conjunctival peritomies (4 per pig eye)
- Completion of 4-8 scleral tunnels
- Entrance of 4-8 wounds into the anterior chamber with the keratome through the scleral tunnel

*Additional Supplies*
- Pig eyes (2 per person)
- Basic saline solution bottle (2 per person)
- Crescent blade (1 unused, per person if disposable)
- Keratome blade (1 unused, per person if disposable)
- Sideport blade (1 unused, per person if disposable)
- Saline bag (1 for AM session, 1 for PM session to inject into vitreous if eyes are too soft)
- 18G needle (2 for AM session, 2 for PM session for injecting the vitreous if eyes are too soft)
- Viscoelastic (2 per person)
- 22G anterior chamber cannula (disposable, 1 per person)

**Day 2: Paracentesis/Viscoelastic/Wound Construction**

*Objectives:*
- Completion of at least 4 paracentesis
- Completion of filling the anterior chamber with viscoelastic (1)
- Practice entering and exiting the eye with cannulas and the sinsky hook until one is able to do so without difficulty (suggestion 20 times)
- Practice setting up anterior chamber maintainer and placing in the eye
- Completion of 4 conjunctival peritomies (4 per pig eye)
- Completion of 4 scleral tunnels
- Entrance of 4 wounds into the anterior chamber with the keratome through the scleral tunnel

*Additional Supplies*
- Pig eye (1 per person; may store the eye for use on Day 3 if supplies are limited)
- Basic saline solution bottle (2 per person)
- Crescent blade (1 unused, per person if disposable, may keep for Day 3)
- Keratome blade (1 unused, per person if disposable, may keep for Day 3)
- Sideport blade (1 unused, per person if disposable, may keep for Day 3)
- Saline bag (1 per person)
- 18G needle (2 for AM session, 2 for PM session; for injecting the vitreous if eyes are too soft)
- Viscoelastic (2 per person)
- 22G anterior chamber cannula (1 per person)
**Day 3: Suturing**

**Objectives:**
- Learning to load the needle under the microscope
- Practice properly handling instruments
- Practice properly handling tissue
- Completion of suturing at least 3 cornea lacerations (1 straight, 1 jagged, 1 stellate)
- Completion of suturing at least 2 scleral wounds
- Completion of suturing conjunctiva
- Practice three types of knots (3-1-1, slip, figure-of-eight)

**Additional Supplies**
- Pig eyes (2 per person; 1 may be new, 1 may be the eye from Day 2)
- Basic saline solution bottle (2 per person)
- Crescent blade (may use from Day 2)
- Keratome blade (may use from Day 2)
- Sideport blade (may use from Day 2)
- Viscoelastic (2 per person)
- 10-0 nylon (2 per person)
- 9-0 nylon (2 per person)
- 8-0 vicryl (1 per person)

---

**Day 4: Capsulorhexis/Hydrodissection/Nucleus Extraction**

**Objectives:**
- Completion of at least 4 capsulorhexis (3 continuous curvilinear on plastic eyes, 1 can opener on pig eye)
- Completion of filling the anterior chamber with viscoelastic (4)
- Completion of all steps of MSICS through nucleus extraction (1 pig eye)
- If time remains, may continue practicing suturing or wound construction on the pig eye

**Additional Supplies**
- Pig eye (1 per person)
- Plastic practice eyes (3 per person; Kitaro preferred, EC Phillips also acceptable)
- Basic saline solution bottle (1 per person)
- Crescent blade (1 unused, per person if disposable)
- Keratome blade (1 unused, per person if disposable)
- Sideport blade (1 unused, per person if disposable)
- Saline bag (1 per person)
- 18G needle (2 for AM session, 2 for PM session for injecting the vitreous if eyes are too soft)
- Viscoelastic (2 per person)
- 5cc syringe (1 per person)
- 1cc syringe (1 per person)
- trypan blue (1 per person)
- 22G anterior chamber cannula (2 per person)
- Cystotome (2 per person, may substitute a 27G needle if necessary)
Day 5: MSICS Start to Finish

Objectives:
- Learning to load the needle under the microscope
- Practice properly handling instruments
- Practice properly handling tissue
- Completion of suturing at least 3 cornea lacerations (1 straight, 1 jagged, 1 stellate)
- Completion of suturing at least 2 scleral wounds
- Completion of suturing conjunctiva
- Practice three types of knots (3-1-1, slip, figure-of-eight)

Additional Supplies
- Pig eyes (2 per person)
- Basic saline solution bottle (1 per person)
- Crescent blade (1 unused, per person if disposable)
- Keratome blade (1 unused, per person if disposable)
- Sideport blade (1 unused, per person if disposable)
- Saline bag (1 per person)
- 18G needle (2 for AM session, 2 for PM session for injecting the vitreous if eyes are too soft)
- Viscoelastic (3 per person)
- 5cc syringe (1 per person)
- 1cc syringe (1 per person)
- trypan blue (1 per person)
- 22G anterior chamber cannula (2 per person)
- Cystotome (2 per person, may substitute a 27G needle if necessary)
- IOL (per person: 1 piece PMMA, 1 three-piece acrylic)

Conclusion

Orbis International is dedicated to the furthering of ophthalmology education across the globe. We believe that the incorporation of a wet lab curriculum is critical to the surgical training of young ophthalmologists. Our hope is that the incorporation of this course, in addition to longitudinal tele-education, the establishment of on-site wet labs, and continuous hospital-based training programs, will enhance the clinical and surgical skills of eye care professionals to the highest of standards.
Instructional Resources

The following is a list of resources that can support the preparation of lectures and discussion for the MSICS wet lab course.

The resources with an asterisk (*) are recommended pre-ready for the course.

7. *Tips for MSICS. Dr. Shivkumar Chandrashekharan, M.S; Cataract and IOL Services, Aravind Eye Hospital and Postgraduate Institute of Ophthalmology, India
15. Tele-medicine Wet Lab Cataract Surgery Course 2017. Instituto Regional De Oftalmología (IRO).
18. MSICS instrument cheat sheet
22. Video Content List- Demonstration videos.
International Council of Ophthalmology (ICO) Ophthalmology Surgical Competency Assessment Rubric (OSCAR) and adapted Ophthalmology Surgical Simulation Competency Assessment Rubric (OSSCAR)

It is recommended to use the OSCAR or the adapted OSSCAR to assess the competency of each wet lab participant post course.


OSSCAR: http://simulatedocularsurgery.com/simulation/cataracts/
Orbis VR Eyesi® Vitreoretinal Course

Orbis Protocol of Vitreoretinal Surgery Simulation – Eyesi®

The use of ocular surgery simulation is growing in multiple educational systems. As an objective of educational programs, developing skills will help trainees to be more effective on surgical treatments and the results that benefit patients. The Eyesi® surgical simulator has three levels of training available, VRT A – C, which we will categorize as basic, intermediate, and advanced.

Basic Course
Uses abstract scenarios to train basic surgical skills, such as instrument navigation in the vitreous and proper OR machine settings. Trainees will also learn to visualize the vitreous through efficient use of microscope and light source.

Learning Objectives:
Reliability gate (3) and minimal required score (40)
- Demonstrate proper set up of non-contact viewing system for optimal visualization and wide field view.
- Demonstrate fluid use of microscope X/Y functions to center the surgical field in the field of view.
- Demonstrate appropriate illumination for depth of field and visualization of tissue details.
- Demonstrate spatial understanding of the vitreous space for safe instrument movements out to the equator and beyond.
- Demonstrate tactical and discrete tilting of the eye with instrument pressure to view the periphery.
- Demonstrate proper instrument handling with forceps and scissors.
- Demonstrate dexterity of the non-dominant hand.

Intermediate Course
Different steps of vitreoretinal surgery will be trained separately; following abstract instrument handling tasks, trainees will practice first steps in peeling and removing membranes in a simulated surgical environment.

Learning Objectives:
Reliability gate (3) and minimal required score (60)
- Demonstrate proper settings for vitrectomy fluidics, for appropriate cutting rates, infusion, and aspiration levels.
- Perform vitrectomy hand piece manipulation for effective tissue cutting and aspiration.
- Demonstrate use of scleral indentation for working in the periphery.
- Perform laser probe manipulation for effective tissue adhesion with minimal burning of healthy retina and/or sensitive structures.
- Demonstrate bimanual dexterity as needed in complex tasks.
- Safely grasp and peel membranes with low to moderate adherence.

* Reliability gate refers to the number of sequential times the task must be successfully completed to be considered competent.
Objective A Tasks
- Vitrector Training Level 2
- Posterior Hyaloid Level 1 and 2

Objective B Tasks
- Forceps Training Level 2
- Laser Level 2
- Bimanual Scissors Training
- Epiretinal Membrane Peeling Levels 1, 2 and 3

Objective C Tasks
- Forceps Training Level 3
- Navigation Training Level 2
- Anti-Tremor-Training Level 5
- ILM Level 1, 2 and 3

### Advanced Course

Refines already acquired surgery skills by training multi-step vitreoretinal procedures under increasingly demanding conditions, such as treatment of retinal detachment.

### Learning Objectives:

**Reliability gate (3) and minimal required score (80)**

a. Demonstrate consistent control of tremor in stressful surgical scenarios.
b. Demonstrate awareness of tissue tolerance during grasping and peeling of highly adherent and/or unstained membranes.
c. Demonstrate proficiency with the non-dominant hand in peeling highly adherent ILM and epiretinal membranes.
d. Describe how cutting rates and directional movements of the vitrectomy probe optimize cutting efficiency with reduced tractional forces on the retina.
e. Demonstrate use of silicone oil and PFC liquid.

The tasks of this course are a mixture of important tasks of previous courses, some on a higher level of difficulty or with non-dominant hand interactions. This course should include:

**Instrument handling tasks:**
- Navigation Training Level 2
- Non-dominant Hand Bimanual Training Level 3
- Anti-Tremor-Training Level 5
- Non-dominant Hand Forceps Training Level 5
- Non-dominant Hand Bimanual Scissors Training Level 4
- Laser Level 6. The objective is to improve bimanual dexterity

**Posterior Hyaloid peeling tasks:**
- Posterior Hyaloid Level 4
- Posterior Hyaloid Level 5

**Epiretinal membranes tasks:**
- Forceps Training Level 4
- Laser Level 3
- Bimanual Scissors Training Level 3
- Epiretinal Membrane Peeling Level 4, 5 and 6

**ILM peeling Tasks:**
- Anti-Tremor Training Level 5
- Forceps Training Level 6 and 7
- ILM Level 4, 5 and 6
**Requirements:**

**Trainees:**
- Advanced program residents with retinal specialty rotations
- Retina fellows in training
- Early-career vitreoretinal specialist

**Trainer:**
- Experienced vitreoretinal surgeon, accustomed to delivering simulation training

**Before Starting, the learner is required to:**
- Describe indications of vitreoretinal surgery;
- Review techniques and steps of vitreoretinal surgery, and articulate the steps to the trainer;
- Study laser techniques and demonstrate competency;
- Investigate and list the multiple vitreoretinal machines and retinal vision systems;
- Learn and describe the machine configurations for surgery and laser.

**Time:** Two days

**Number of trainees:** Two per trainer
Orbis VR Eyesi® Advanced Cataract Course

Prepared by: Dr. Andreas Di Luciano, MD

Cataract Course (Advanced)

Training Objectives:

• Effective use of cystotome and forceps flap construction in normal and under demanding conditions, such as increasing capsule tensions and weak zonules and complications.
• Proper use of viscoelastic fluid to preserve chamber depth and flap stability during the rhexis.
• Rhexis technique on high tension capsule.
• Hydrodissection technique for dense nucleus.
• Complete I&A step using straight or bent tip for either coaxial or bimanual irrigation and aspiration.
• Complete phaco divide and conquer procedure with sculpting, cracking, quadrant removal.
• “Stop and Chop” technique.
• Correct insertion of Toric IOL.

Specific Objectives: Reliability gate (3)a and minimal required score (70-80)

1. Each trainee will perform successfully a CCC with Utrata forceps in errant tear, with weak zonules and capsule, in white cataract and in cases of capsular plaques.
2. Each trainee will demonstrate the technique for hydrodissection and hydrodelineation in unusual cases.
3. Each trainee will make successfully a groove (“Stop and Chop”) and two grooves (“Divide and Conquer”).
4. Each trainee will demonstrate the correct technique to successfully perform phacoemulsification using photodynamic concepts.
5. Each trainee will successfully insert an IOL in the bag using Malyugin Ring.
6. Each trainee will successfully perform an anterior vitrectomy.

Capsulorhexis

1. Capsulorhexis errant tear: Refine the technique of creating a clockwise/counterclockwise rhexis under increasingly difficult conditions; capsule tension and the tear tends to run outwards.
2. Weak Zonules and Capsules: Capsular tension varies from low to high; in some tasks the tear tends to run outwards.
3. White Cataract: Practice the steps and precautions needed when dealing with white cataracts.
4. Capsulorhexis Capsular Plaques: Focus on anterior plaques of varying size and location.

a Reliability gate refers to the number of sequential times the task must be successfully completed to be considered competent.
# ANNEX T

<table>
<thead>
<tr>
<th>Type</th>
<th>Tension or grade</th>
<th>Reliability gate</th>
<th>Required score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capsulorhexis</td>
<td>Low without guiding elements</td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td>Capsulorhexis (CAT-C)</td>
<td>Medium without guiding elements</td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td>Capsulorhexis (CAT-C)</td>
<td>High without guiding elements</td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td>Capsulorhexis: Errant tear (CAT-D)</td>
<td>Medium/ High</td>
<td>3</td>
<td>80</td>
</tr>
<tr>
<td>Capsulorhexis: Weak zonules (CAT-D)</td>
<td>Low/Medium/High capsular tension</td>
<td>3</td>
<td>80</td>
</tr>
<tr>
<td>Capsulorhexis: Weak zonules and errant tear (CAT-D)</td>
<td>Low/Medium/High</td>
<td>3</td>
<td>80</td>
</tr>
<tr>
<td>White Cataract (CAT-D)</td>
<td>Low/Medium/High</td>
<td>3</td>
<td>80</td>
</tr>
<tr>
<td>Capsulorhexis Capsular Plaques (CAT D)</td>
<td>Low/Medium/High</td>
<td>3</td>
<td>80</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>Level</th>
<th>Reliability gate</th>
<th>Required score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Divide and Conquer</td>
<td>3-9 (varying situations)</td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td>Hydro Maneuver (CAT-C)</td>
<td></td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td>Phaco Divide and Conquer (CAT-C)</td>
<td>4-6</td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td>Chopping</td>
<td></td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td>Cracking &amp; Chopping (CAT-C)</td>
<td>5-8</td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td>Phaco Chopping (CAT-C)</td>
<td>3 (full nucleus, <em>horizontal chopper</em>) 4 (half nucleus, <em>vertical chopper</em>) 5 (two half nuclei, <em>vertical chopper</em>) 6 (full nucleus, <em>vertical chopper</em>)</td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td>Irrigation/Aspiration</td>
<td></td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td>Irrigation and Aspiration (CAT- C)</td>
<td></td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td>Irrigation and Aspiration in weak zonules (CAT- D)</td>
<td>5</td>
<td>3</td>
<td>80</td>
</tr>
<tr>
<td>IOL insertion</td>
<td></td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td>IOL insertion</td>
<td>2 (IOL inserted, remove viscoelastic)</td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td>IOL insertion</td>
<td>4 (insert Toric IOL) 8 (correct misplaced Toric IOL)</td>
<td>3</td>
<td>70</td>
</tr>
</tbody>
</table>
Orbis VR Eyesi® Basic Cataract Course

VR Eyesi® Cataract Course (Basic)

**General objectives:**
1. Pre-operatively, to familiarize learner with the instruments needed during surgery
2. To determine if novice surgeons are ready to work in the operating room
3. Monitor performance in the early training of residents
4. Decrease the cataract complication rates of novice surgeons
5. Provide trainees with repetitious opportunities to gain skills

**Training Objectives:**
- Effective forceps techniques for optimal tissue manipulation during rhexis
- Understanding of appropriate vector forces for the rhexis
- Effective bimanual movements for phaco chopping
- Optimizing the fluidics of the phaco probe during each step of cataract surgery
- Safe aspiration of cortex during irrigation and aspiration
- Safe use of ultrasound and aspiration during quadrant removal
- Efficient sculpting for divide and conquer technique
- Efficient nucleus cracking
- Correct insertion of a spherical IOL

**Specific Objectives: Reliability gate (3)a and minimal required score (60)**
1. Each trainee will perform successfully a CCC with Utrata forceps.
2. Each trainee will demonstrate the technique for hydrodissection and hydrodelineation.
3. Each trainee will make successfully a groove (“Stop and Chop”) and two grooves (“Divide and Conquer”).
4. Each trainee will demonstrate the correct technique to successfully perform phacoemulsification (with preset settings of the phacomachine).
5. Each trainee will successfully insert an IOL in the bag.

*a Reliability gate refers to the number of sequential times the task must be successfully completed to be considered competent.*
### ANNEX U

**Capsulorhexis (CAT-B)**

<table>
<thead>
<tr>
<th>Type</th>
<th>Initial Flap (CCW)</th>
<th>Tension</th>
<th>Reliability gate</th>
<th>Required score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capsulorhexis</td>
<td>CCW 0°</td>
<td>Low Tension</td>
<td>3</td>
<td>60</td>
</tr>
<tr>
<td>Capsulorhexis</td>
<td>CCW 90°</td>
<td>Low Tension</td>
<td>3</td>
<td>60</td>
</tr>
<tr>
<td>Capsulorhexis</td>
<td>CCW 180°</td>
<td>Medium tension</td>
<td>3</td>
<td>60</td>
</tr>
<tr>
<td>Capsulorhexis</td>
<td>CCW 270°</td>
<td>Medium tension</td>
<td>3</td>
<td>60</td>
</tr>
<tr>
<td>Capsulorhexis</td>
<td>CCW 0°</td>
<td>Medium tension</td>
<td>3</td>
<td>60</td>
</tr>
</tbody>
</table>

- **CCW**: In the CAT-B capsulorhexis task, the initial flap is already there, so the trainee doesn’t have to create it.
- **The angle** specifies the position of the flap. For example, an angle of 90° means that the flap is located at three o’clock position.
- **Tension**: The higher the tension is, the more difficult it gets to perform an even rhesis because the tear tends to run outwards.

<table>
<thead>
<tr>
<th>Type</th>
<th>Level</th>
<th>Reliability gate</th>
<th>Required score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anti-Tremor</td>
<td>3</td>
<td>3</td>
<td>60</td>
</tr>
<tr>
<td>Anti-Tremor</td>
<td>4</td>
<td>3</td>
<td>60</td>
</tr>
</tbody>
</table>

**Intracapsular Tissue (CAT-B)**

This is designed to introduce essential skills needed in phaco surgery: hydrodissection and hydrodelination, as well as removal of the lens and residual cortex.

<table>
<thead>
<tr>
<th>Type of task</th>
<th>Level</th>
<th>Reliability gate</th>
<th>Required score</th>
</tr>
</thead>
<tbody>
<tr>
<td>IOL insertion</td>
<td>1,2,3</td>
<td>3</td>
<td>60</td>
</tr>
<tr>
<td>IOL insertion</td>
<td>1 (one lens quarter)</td>
<td>3</td>
<td>60</td>
</tr>
<tr>
<td>IOL insertion</td>
<td>2 (four lens quarters)</td>
<td>3</td>
<td>60</td>
</tr>
<tr>
<td>IOL insertion</td>
<td>1 (one quarter)</td>
<td>3</td>
<td>60</td>
</tr>
<tr>
<td>IOL insertion</td>
<td>2 (three quarters)</td>
<td>3</td>
<td>60</td>
</tr>
</tbody>
</table>
**ANNEX U**

## Stop and Chop

It will teach skills needed for applying the “Stop and Chop” technique for nuclear segmentation and removal.

<table>
<thead>
<tr>
<th>Type of task</th>
<th>Level</th>
<th>Reliability gate</th>
<th>Required score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phaco “Divide and Conquer”</td>
<td>3 (sculpin performed, crack in two halves)</td>
<td>3</td>
<td>60</td>
</tr>
<tr>
<td>Phaco Chopping</td>
<td>1 (half nucleus, horizontal chopper)</td>
<td>3</td>
<td>60</td>
</tr>
<tr>
<td>Phaco “Divide and Conquer”</td>
<td>8 (Sculpt and crack into two halves)</td>
<td>3</td>
<td>60</td>
</tr>
<tr>
<td>Phaco Chopping</td>
<td>2 (Two half nuclei, horizontal chopper)</td>
<td>3</td>
<td>60</td>
</tr>
</tbody>
</table>

## IOL insertion

<table>
<thead>
<tr>
<th>Type of task</th>
<th>Level</th>
<th>Reliability gate</th>
<th>Required score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydro Maneuvers</td>
<td>1 (Spheric IOL inserted, removed viscoelastic)</td>
<td>3</td>
<td>60</td>
</tr>
<tr>
<td>Phaco Divide and Conquer</td>
<td>3 (Insert spheric IOL)</td>
<td>3</td>
<td>60</td>
</tr>
<tr>
<td>Irrigation and Aspiration</td>
<td>7 (correct misplaced spheric IOL)</td>
<td>3</td>
<td>60</td>
</tr>
</tbody>
</table>
ANNEX V

Wet Lab laboratory Manual for Ophthalmology Residents in Ethiopia
ANNEX V

Wet Laboratory Manual for Ophthalmology Residents in Ethiopia

Prepared by: Dr. Yared Assefa, (Ass. Professor, Anterior Segment), Department of Ophthalmology, University of Gondar, 12/3/2019

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Acronyms

A/C Anterior Chamber
ACM Anterior Chamber Maintainer
BSS Balanced Salt Solution
IOL Intraocular Lens
IOP Intraocular Pressure
IPD Interpupillary Distance
MSICS Manual Small Incision Cataract Surgery
OPMI Operating Microscope
OR Operating Room
OSSCAR Ophthalmic Simulated Surgical Competency Assessment Rubric
OVD Ocular Viscosurgical Device
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## ANNEX V

### Wet Lab Practice VI: Paracentesis, Entering the Main Wound, Viscoelastic Insertion

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<td>75</td>
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<td>Entering The Wound</td>
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<tr>
<td>Background</td>
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### Wet Lab Practice VII: Anterior Capsulotomy, Hydrodissection, and Nucleus Extraction

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### Wet Lab Practice VIII: Cortex Removal, IOL Insertion, Wound Inspection and Closure of Wound

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Preface (from The Ophthalmological Society of Ethiopia)

The Ophthalmology residency training programs in Ethiopia are expanding. However, lack of control guidelines, standard operating procedures and appropriate wet-lab facilities are the main limitations affecting the quality of training. Surgical competency is a vital and necessary part of the residency training program. Ophthalmologic surgical training is passing through a critical or “turbulent” time. With an increasing demand for competent health professionals, maintaining the quality of training in Ophthalmology is a challenge.

The Ophthalmological Society of Ethiopia (OSE), which aims to eliminate the needless blindness and visual impairment that results from preventable and treatable eye diseases by ensuring that all people in Ethiopia have access to high-quality and affordable eye care services, and promoting the access of professionals to the quality training and continuing education they need to provide such eye care, through capacity building, research and publications, strives for competent, qualified training for Ophthalmologists through standardized guidelines and training manuals.

This Wet Laboratory Manual for Ophthalmology Residents has been developed in response to an urgent need to develop a means of standardization and assessment in order to ensure the provision of adequate and satisfactory training.

The OSE strongly believe this manual will provide the best possible hands-on medical education support and create a great training environment. By implementing this manual, the knowledge and skills of the residents will be standardized across the residency programs in Ethiopia.

I wish to acknowledge the remarkable initiative and contribution of our late esteemed member Dr. Yared Assefa, and the excellent work of staff Ophthalmologists and Ethiopian Ophthalmology Residency Training program coordinators from Addis Ababa, Gondar, Hawassa and Jimma Universities and Saint Paul’s Millennium Medical College. I also wish to extend appreciation to our esteemed partners, including Orbis International, for the realization of this manual through their unreserved technical and financial support.

Dr. Sadik Taju Sherief
Consultant Pediatrics and Strabismus Ophthalmologist
Secretary General, Ophthalmological Society of Ethiopia
Background

Laboratory practice based on wet or dry laboratories is a well-accepted method to acquire surgical skill before starting to do surgical procedures on human beings. A wet-laboratory practice is defined as doing a wide range of laboratory experiments or analysis of various types of chemical or biological materials.

An ophthalmology wet-lab is a place where ophthalmologists or residents perform different types of surgical experiments on animal eyes, commonly porcine eyes. Unlike the dry ophthalmic lab, where artificial eyes or technology-based simulators are used, the wet lab is exposed to different biological hazards and needs special precautions and daily maintenance. However, wet-lab practice remains an option for ophthalmology residents to acquire surgical skills in intraocular surgery so that they will have a smooth transition to perform surgical procedures on human eyes.

The objective of this wet-lab manual is to provide ophthalmology residents with clear guidelines on what they are expected to perform during the practice session. The manual focuses mainly on the use of operating a microscope and performing different types of intraocular surgical procedures, with emphasis on cataract, cornea and glaucoma surgical procedures. The manual has a total of nine wet-laboratory practices. Each practice includes background information describing the practice, the objectives of the practice, the materials needed to perform the practice as well as practical instructions on how to perform the practice.

It is highly recommended that you start this wet-lab practice after successfully completing the Fundamentals of Manual Small Incision Cataract Surgery (MSICS) Course – Cybersight Platform at the end of the first-year residency program. This supplemental course serves as an objective evaluation of the resident’s readiness to perform cataract surgical procedures. This supplement will be required to be completed prior to performing cataract surgical procedures on patients. Evaluation of competencies will be graded by the Ophthalmology faculty at the resident’s respective residency program.

For more detail visit https://cybersight.org/

Fundamentals of the MSICS Course on Cybersight include:

- **Module 1**: Evaluation of the Adult Cataract and Preoperative Assessment
- **Module 2**: Manual Small Incision Cataract Surgery
- **Module 3**: Post-Operative Care of the Cataract Patient
Any resident who fails to observe and implement these rules will be denied access to the wet lab and will face a delay in his/her progressive evaluation. Academic measures will be taken to ensure patient safety.

**Rules of Conduct**

Ophthalmology wet/dry labs should be treated as real operating theaters with activities an exact copy of OR conditions in reality. Any resident who practices in the wet/dry lab should behave responsibly and always follow the rules of conduct stated below:

1. The practicing trainee should strictly implement the aseptic techniques observed in the real OR. This includes using disposable gloves when cleaning and preparing the working space, proper surgical scrubbing of hands, wearing a head cap and face mask, and using surgical gloves when commencing the surgical procedure.

2. Every practicing trainee should clean and dust off the working space and medical equipment at the start and end of the procedure. This includes cleaning the desk, chair and operating microscope, and applying the microscope cover. The wet-lab room cleaning should be communicated to cleaners assigned to the area.

3. All surgical instruments and materials required for the specific planned procedure should be prepared beforehand, after cleaning the working space and large equipment like the operating microscope.

4. The checklist for the specific practice should be submitted or posted on the white board. This checklist serves the dual purpose of facilitating the skills training and evaluating the trainee on the process.

5. All sharp objects should be disposed of in the safety box. This includes used crescent knives, keratomes, surgical blades, and needles.

6. All solid non-sharp waste should be disposed of in the waste bin.

7. Organic tissues and materials should be disposed of in the standard segregated large waste baskets.

8. Fine or delicate tip instruments should be cleaned with a toothbrush, rinsed and packed away again for the next use.

9. Trainees should register themselves in the wet-lab logbook when they start and finish their practice for the day. Time for each step in the surgical practice should be clearly documented and included as one of the parameters for the assessment of each trainee.

10. All steps of the procedure during the practice should be recorded using pixel filer software. This can be installed from the digital imaging CD or by requesting help from the wet-lab focal person. This is crucial in delivering objective feedback to the trainee.

11. Any malfunction of equipment and instrument should be reported right away to the residency coordinator through the resident wet/dry-lab coordinator.
Wet Lab Practice I: Surgical Microscope Basics / Use of Microscope

OPERATING/SURGICAL MICROSCOPE

Background

An operating microscope is an optical instrument that provides the resident/surgeon with a stereoscopic, high quality, magnified and illuminated image of the small structures in the surgical area. It requires the surgeon to assume a particular position, which needs to be maintained for a few hours, and this may hinder certain manipulations. Therefore, the resident should be familiar and accustomed with the posture and manipulations in order to master the use of the operating microscope. Restriction of the visual field is also one of the challenges that makes surgical manipulations difficult between the microscope and the operating field. Mastering the principles and basic techniques of ocular microsurgery is gratifying.

Objectives

The resident is expected to:

- Identify the different parts of the operating microscope.
- Describe the different functions of the parts of the operating microscope.
- Demonstrate how to properly use the operating microscope (adjust binocularity, focus, etc.).
- Describe how to care for and maintain the operating microscope (show how to do routine preventive maintenance).

Materials Needed

- Stabilizer
- Stool and table
- Practicing eye
- Operating microscope

Practical Instructions

- Switch on the operating microscope and adjust the illumination moderately so the brightness is just enough for a good view.
- Clean the lenses with a lens cloth only, do not use paper towel, tissue or a regular cloth.
- Loosen the necessary knobs to gently move the microscope arms.
- Never force the movements.
- Learn which knob goes with which arm.
- Practice with the red reflex adjustment.
- Adjust your IPD.
- Adjust the oculars depending on the refractive status of your eye.
- Sit down on the stool comfortably so your back is straight.
- Adjust the focus by bringing the microscope down until you are first in focus, then stop (this will eliminate accommodation), then adjust fine focus with the foot pedal.
- Use the foot pedal or the knobs to adjust the magnification and the focus on the operating microscope.
- Always use the microscope with an electric stabilizer.
- When not in use, tighten the knobs, cover the microscope and put the foot pedal on the floor.
ANNEX V

Wet Lab Practice II: Identifying and Using Key Microsurgical Instruments

OPHTHALMIC MICROSURGICAL INSTRUMENTS

Background

Ophthalmic surgical instruments are classified into extraocular and intraocular microsurgical instruments. Knowing each type of instrument is very important so that the resident can use the right instrument for the intended purpose. For example, a needle holder used to hold 4/0 silk can’t be used to hold a 10-0 nylon. The purpose of this wet-lab practice is to know and identify the types of ophthalmic microsurgical instruments that are used in intraocular surgery. Intraocular/microsurgical instruments are categorized as sharp and blunt instruments. Sharp instruments are classified into scissors, knives and blades. Blunt instruments are classified into needle holders, cannulas, speculum, spatulas, different forceps, ball cautery, etc.

Objectives

The resident is expected to:

- Identify the different types of microsurgical instruments that are used for intraocular procedures.
- Describe the use of the microsurgical instruments in intraocular surgery.

Materials Needed

- Sharp microsurgical instruments
- Blunt microsurgical instruments

Practical Instructions

- Identify the types and use of sharp instruments
  - Scissors
    - Westcotts scissor (conjunctival)
    - De Weckers (iridectomy)
    - Barraquers (corneoscleral)
    - Vannus
  - Knives/blades
    - Keratome, crescent, 15 degree (side port) and others
    - Blades (various types used for external and intraocular surgeries)
- Identify the types and use of blunt instruments
  - Artery (Haemostat) forceps
  - Drape forceps (towel clips)
  - Iris spatula
  - Cautery ball
  - Muscle hooks
  - Caliper
  - Simcoe
  - Vectis loop
  - Needle holder
  - Dissecting forceps: toothed and non-toothed, grooved (notched)
  - Superior rectus forceps
  - Speculum
  - Cannula
  - Retractors
  - Colibri (straight, curved)
### INTRAOCULAR FLUIDS

#### Ocular Viscosurgical Devices (OVD)

Gel-like materials that protect intraocular structures, maintain space and allow manipulation of crystalline and intraocular lenses. They can be:

- **Cohesive**: most useful in maintaining AC space
- **Dispersive**: for prolonged corneal endothelial cell protection

#### Mydriatics and Myotics

- Intracameral mydriatics can be used to supplement or replace dilating drops. 0.5ml preservative free epinephrine 1:1000 diluted 1:10 BSS is injected directly into the AC before injection of OVD.
- Intracameral myotics are used in glaucoma surgery to constrict the pupil to facilitate creation of iridectomy, in corneal transplant surgery to help protect the crystalline lens during trephination, and in cataract surgery to prevent iris capture of IOL. Miochol 1% acetylcholine and Miostat 0.01% carbachol 0.5 ml is injected into AC.

#### Capsular Staining Agents

In cases of dense white cataract, capsular staining agents enhance the visualization of the capsulorrhexis. Trypan blue is the FDA approved agent.

1. Inject underneath air bubble
2. Allow it to stay for 20-30 seconds
3. Exchange for BSS or OVD or inject without air and irrigate immediately
Annex V

Wet Lab Practice III: Conjunctival Peritomy

**Conjunctival Peritomy**

**Background**

Conjunctival peritomy is creating an opening in the conjunctiva by cutting a strip of conjunctiva near the limbus, so that the sclera gets exposed in order to make scleral incisions or scleral flaps for different types of intraocular procedures. Basically, there are two types of conjunctival flaps or peritomies called **Fornix based** and **Limbal based flaps**. Depending on the type of incision between four-six o'clock corneoscleral limbus could be exposed.

**Objectives**

- Name and describe all the steps of conjunctival peritomy.
- Identify the instruments needed for conjunctival peritomy.
- Proper tissue and instrument handling & stabilizing the hands.
- Manage hemostasis of the conjunctival peritomy.

**Materials Needed**

- Operating microscope
- Well exposed globe
- Cotton tip applicators or sponge
- Conjunctival scissors
- Simple conjunctival forceps
- 0.12 forceps
- Cautery (burning flame or battery powered)
- Ball/muscle hook

**Practical Instructions**

- Adjust your IPD in the operating microscope.
- Adjust your focus.
- Hold the conjunctiva with simple forceps near the limbus and pull it up.
- Make a snip incision with the conjunctival scissors and create a hole so that you can get an entry.
- Let your scissors gets into the opening and do a blunt dissection of the conjunctiva near the limbus and up to 2mm behind the limbus.
- Incise the dissected conjunctiva nasally and temporally, and make relaxing incisions.
- Use cotton tip applicators or sponge to stop the bleeding and use the ball cautery to stop the bleeding by cauterizing the bleeding vessels.
Wet Lab Practice IV: Wound Construction

Background
After performing conjunctival peritomy in intraocular surgery, the next step is wound construction to get access to the anterior segment of the eye. Basically, there are three types of incisions for anterior segment surgery: namely scleral tunnel incision; limbal incision; and clear corneal incision. The sclerolimbal incision is more posterior than the clear corneal incision with much bleeding but less astigmatic effect on postoperative visual acuity of patients. However, the clear corneal incision has no/minimal bleeding with greater astigmatic effect on postoperative visual acuity. In order to construct the wound well, the resident is expected to have a good knowledge of the anatomy of the surgical limbus.

Objectives
• Construct a good wound for intraocular surgeries (mainly for cataract and glaucoma surgeries).
• Perform a sclerolimbal incision.
• Perform clear corneal incision.
• Perform scleral flap incision for trabeculectomy.

Materials Needed
• Crescent knife
• Keratome knife
• 0.12 forceps
• Operating microscope
• Scleral frown groove incision viscoelastic agent

Practical Instructions

Sclerolimbal Tunnel Incision
• Adjust your focus.
• 2mm behind the limbus, about 7-8mm in length.

Funnel-shaped Sclerocorneal Tunnel Incision
• Create a scleral tunnel with the crescent knife until you reach a clear cornea.
• Move the crescent blade nasally and temporally.
• Advance the crescent anteriorly in the cornea going slightly uphill.
• Inject viscoelastic into the tunnel.
• Insert keratome knife so that its tip points toward the macula and cuts through the Descemet’s membrane.
• Advance the keratome knife parallel to the iris plane until the shoulders of the knife have passed the internal edges of the incision.
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**Wet Lab Practice V: Suture Technique, Knots and Approaching Corneal Laceration Repair**

**SUTURE TECHNIQUE**

**Background**

Corneal surgery requires an operating microscope, highly specialized microsurgical tools such as fine toothed forceps, fine scissors, tying forceps, needle holders and essential adjuncts to the microsurgical instruments, including 10-0 or 11-0 monofilament suture. The forceps in corneal surgery must have fine teeth that enable appropriate stabilization of corneal tissue while a fine-tip needle holder is used to pass suture. Single-point fixation forceps, typically 0.12mm forceps, are used for tissue stabilization with care to avoid excessive grabbing or compression that may lead to tissue maceration. These forceps have a tying platform that can be used to hold one suture end during tying of the knot. The fine-tip needle holder can be used to hold the other suture end during tying of the knot. Alternatively, tying forceps can be used for suture tying once a suture has been adequately placed. Surgical knots are classified into interrupted and continuous and the resident is expected to acquire the skill of knotting very well.

**Objectives**

- Perform a competent surgical knot.
- Perform sutures and create secured surgical knots on cornea that form a watertight corneal wound with less astigmatism.

**Materials Needed**

- Sutures (10-0 nylon)
- Needle holder
- 0.12 forceps
- Tying forceps
- Scissors
- OVD
Practical Instructions

- Insert viscoelastic through the wound or a paracentesis.
- Use 10-0 nylon sutures.
- Pass the needle through 90% depth of the stroma so it's of equal depth on each side.
- Avoid shallow sutures.
- Sutures should be deep enough and equidistant from the wound margins.
- Avoid full thickness sutures.
- Avoid loose sutures.
- In corneoscleral tears, start with sutures at the limbus and avoid sutures of unequal length.
- For shelved lacerations, sutures should be placed equidistant with respect to the internal aspect of the wound to achieve good wound apposition.
- Make the suture bites close to the visual axis short.
- Bury the suture knot with the help of OVD at the completion of the suturing.
- Leave the wound watertight.

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Wet Lab Practice VI: Paracentesis, Entering the Main Wound, and Viscoelastic Insertion

**Background**

The paracentesis wound is made at the nine o'clock position to insert viscoelastic solution and capsulotomy prior to entering the main wound.

**Objective**

- Facilitate intraoperative manipulations from the side port without entry from the main wound and a formed anterior chamber.
**Materials Needed**

- Myringotomy needle
- 0.12 forceps

**Practical Instructions**

- Stabilize the globe with 0.12 forceps.
- Make a paracentesis /stab incision at nine o'clock position at clear cornea of about 1.5mm.
- Pass the needle parallel to the iris plane.

---

**ENTERING THE WOUND**

**Background**

Entering the wound via the tunnel is very important to construct a self-sealing wound that does not leak and is watertight. A keratome blade is used to enter and form a funnel-shaped wound, which makes the delivery of the nucleus easier.

**Objective**

- Form a self-sealing and watertight wound.

**Materials Needed**

- OVD
- 0.12 forceps
- Keratome blade

**Practical Instructions**

- Adjust the microscope very well so that the wound incision is very visible.
- Insert OVD into the tunnel for smooth insertion of the keratome blade.
- Insert the keratome blade and aim to the macula or down stroke.
- No upstroke.
- Point down and enter the anterior chamber parallel to the pupillary plane.
- Observe gush of fluid.
- Extend the incision nasally and temporally.
- Inspect for any Descemet tear.
VISCOELASTIC INSERTION

Background

Inserting a viscoelastic solution into the anterior chamber is crucial to protect the intraocular tissues, especially the corneal endothelium, and facilitate intraocular manipulations procedures like capsulotomy and nucleus delivery. Therefore, acquiring this skill is mandatory for residents.

Objective

- Demonstrate competency in using OVD in intraocular surgery so that intraoperative manipulation of ocular tissues is well performed with a good postoperative outcome of procedures.

Materials Needed

- OVD
- 2cc syringe
- Cannula

Practical Instructions

- Identify the paracentesis wound at nine o'clock position.
- Insert the cannula tip gently parallel to the iris plane.
- Inject the viscoelastic solution until the anterior chamber gets reformed.
- Avoid excessive viscoelastic solution.

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| VI               | 2                        | Pig Eyes| 2                           | Paracentesis, Entering the Main Wound, Viscoelastic Insertion | Video Six: 20 paracentesis and entering with cannula through para 20 times, insertion of OVD on final time  
Video Seven: 4 keratome incisions performed, one on each quadrant of 1 pig eye (to be recorded after 10 have been practiced prior to recording) |
Wet Lab Practice VII: Anterior Capsulotomy, Hydrodissection, and Nucleus Extraction

Anterior Capsulotomy

Background

The main function of the anterior capsulotomy is to permit removal of the cataract while leaving behind the intact posterior capsular bag, which provides stabilization for the IOL to be implanted. There are many techniques for opening the anterior capsule. A sharp cystotome or bent needle may be used to make a series of connected punctures or small tears in a circle to create the can-opener capsulotomy. Alternatively, the surgeon can create a smooth capsulorrhexis by making a puncture or small tear. The edge of this tear is then grasped with the cystotome needle tip or with forceps and pulled around smoothly, removing a circular portion of anterior capsule. This technique provides greater structural integrity for the lens capsule to maintain implant stability and centration. If a small capsulorrhexis is created and manual expression is planned, relaxing incisions are often made in the superior aspect of the capsulorrhexis, to allow the nucleus adequate room to exit the capsule during expression.

Objective

• Perform safe opening of the anterior capsule so that the nucleus can be delivered smoothly.

Materials Needed

• OVD
• Anterior chamber maintainer
• Cystotome needle
• Capsulorrhexis forceps
• Trypan blue staining agent

Practical Instructions

• Adjust the magnification and focus of the microscope so that anterior capsule is well focused.
• Inject air into the anterior chamber.
• Inject trypan blue.
• Inject OVD.
• Use cystotome needle or utrata forceps to do anterior capsulotomy.
ANNEX V

HYDRODISSECTION

Background

Proper dissection of the nucleus material from cortex and the capsule is a crucial step to avoid surgical complications and safe delivery of the nucleus. Hence acquiring this skill makes the intraoperative course smooth for the surgeon. This procedure can usually be done using irrigating cannula through the paracentesis or a simco cannula through the main wound.

Objective

- Acquire the skill for a smooth release of the nucleus from the other parts of the nucleus so that nucleus will be delivered smoothly.

Materials Needed

- Irrigating cannula
- Anterior chamber maintainer
- OVD

Practical Instructions

- Introduce an irrigating cannula through the paracentesis.
- Place the tip of the cannula just under the capsule at six o’clock position.
- Irrigate fluid gently under the capsule until you see fluid perfusing under the nucleus.
- Extend the cannula about 1mm-2mm under the capsule.
- Hydrodissect gently at three and nine o’clock until you see the upper pole of the nucleus prolapse.

NUCLEUS EXPRESSION OR EXTRACTION

Background

Extracting the nucleus is a critical step that determines the outcome of cataract surgery as the procedure may be associated with trauma to the corneal endothelium, so maximum care should be taken during this procedure. There are basically two types of nucleus extraction: manual expression or fragmentation of the nucleus into pieces using ultrasound waves. This manual deals with the manual extraction of the nucleus. Manual expression involves pressing on the inferior limbus to tip the superior pole of the nucleus up and out of the capsular bag. Additional counter pressure on the globe from an instrument holding the sclera posterior to the limbus 180° away from the incision will express the nucleus from the chamber. The surgeon removes the nucleus from the eye by loosening and elevating it from the capsule, using a hook or irrigating cannula, and then supporting it on a lens loop, spoon, or Vectis that will slide or irrigate it out of the chamber.
Objective

- To let residents acquire good skills in nucleus delivery and minimize surgical complications associated with the procedure.

Materials Needed

- OVD
- ACM
- Lens glide sheet
- Irrigating Vectis
- Lens loop

Practical Instructions

- Adjust the focus of the operating microscope.
- Insert OVD into the anterior chamber below and above the nucleus.
- Make sure the nucleus is rotating freely.
- Use either irrigating Vectis or Vectis loop to extract the lens.
- Be careful and gentle not to touch the corneal endothelium or other intraocular structures while removing the nucleus.
- Make sure the whole nucleus is removed and there are no nuclear fragments left.

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| VII              | 8                        | Pig Eyes | 10                          | Anterior Capsulotomy, Hydrodissection, and Nucleus Extraction | **Video Eight**: 30 repetitions of dominant and non-dominant instrument movement in AC  
**Video Nine**: 10 capsulorrhexis  
**Video Ten**: Hydrodissections; 10 nucleus rotations |
Wet Lab Practice VIII: Cortex Removal, IOL Insertion and Implantation, Wound Inspection and Closure of Wound

CORTEX REMOVAL

Background

Cortical removal is an important part of cataract surgery that has a tremendous effect on the immediate as well as the late post-operative outcome of the surgery. Hence a thorough cleanup of the cortex is a crucial step. However, during the clean up, certain cortex complications like a posterior capsular tear and vitreous loss could occur and therefore precautions should be taken to avoid this.

Objective

• Acquire the proper skill to remove the cortex adequately without intraoperative complications.

Materials Needed

• Balanced salt solution/normal saline/ringer lactate solution
• OVD
• Simcoe cannula
• 10cc syringe

Practical Instructions

• Make sure the irrigation flow rate is appropriate to maintain the anterior camber, but does not create too much turbulence in the eye prior to insertion into the wound.
• Once in the eye, ensure adequate suction with the Simcoe cannula by testing a readily available piece of cortex. If inadequate suction, change the cannula immediately.
• Adjust the microscope/patient’s head as needed to ensure adequate red reflex and that all portions of capsular bag (anterior capsular flap, posterior capsule) can be identified and distinguished from the cortical contents.
Background

The purpose of modern cataract surgery is to restore vision after the removal of the natural lens. Proper insertion of the IOL in the correct position, i.e., preferably in the bag placement, should be the main goal.

Objective

• Acquire the proper skills on how to implant the IOL in the bag.

Materials Needed

• OVD
• McPherson forceps
• Tying forceps
• Sinisky hook

Practical Instructions

• Make sure the operating microscope is adjusted to give a full field view of the eye.
• Ensure good visibility of the anterior chamber, anterior capsule and the wound incision.
• Insert OVD into the anterior chamber or use the ACM.
• Advance the IOL through the incision.
• Place the leading haptic into position.
• Bring the IOL optic into the pupil.
• Flex the trailing haptic and place into position using tying forceps or use dialer to rotate the IOL clockwise.
ANNEX V

WOUND INSPECTION AND CLOSURE OF WOUND

Background

After the completion of the surgery, it is important to inspect the wound for proper closure, so that post-op wound complications can be avoided.

Objective

- To let residents acquire the skill of how to properly inspect the wound, and properly secure the wound with no post-operative complications.

Materials Needed

- Irrigating cannula
- Irrigating fluid
- Sponge to cotton applicator
- Stitches
- Needle holder
- Tying forceps
- Cautery

Practical Instructions

- Test the wound for leakage by irrigating fluid through the paracentesis.
- If there is leakage, hydrate the incisions with irrigating fluid or apply one stich at the wound site.
- Reapproximate the conjunctiva at the limbus either with cautery or stitches.

<table>
<thead>
<tr>
<th>Wet Lab Practice</th>
<th>Number of Practice Weeks</th>
<th>Model</th>
<th>Number of Eyes per Resident</th>
<th>Topic</th>
<th>Video Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>VIII</td>
<td>4</td>
<td>Pig Eyes</td>
<td>5</td>
<td>Cortex Removal, IOL Insertion, Wound Check and Closure of Wound</td>
<td>Video Eleven: 10 I/A with Simcoe; 10 IOL insertions in the bag, with 10 wound checks; 1 wound suture recorded after 10 practices</td>
</tr>
</tbody>
</table>
Wet Lab Practice IX: Trabeculectomy

TRABECULECTOMY

Background

Trabeculectomy needs knowledge of the anatomical structures of the ocular tissue to be handled during practice. Wet lab practice is helpful to get experience and develop confidence on operating on the ocular structures involved in filtration surgery, before starting surgery on patients. Having stable hands and being capable of gentle tissue handling and suturing are the key areas to be practiced in the wet lab. Trabeculectomy is a procedure that looks easy to do, but it is a procedure that should be done by a surgeon/fellow/resident with stable hands, confidence, and patience.

Objective

- To acquire skills in corneal traction, peritomy, scleral flap construction, pre-placed sutures, peripheral iridectomy, scleral flap and conjunctiva closure.

Materials Needed

- Sutures:
  - 4.0, 8.0 and 9.0
- Instruments:
  - Speculum
  - Ball cautery
  - Forceps: artery, simple and toothed
- Scissors: Vannus and conjunctival
- Blade: #15 and/or crescent, 1.2mm side port sharp blade
- Needle holder
- Tying forceps: straight and curved
- Irrigating cannula and fluid
- Syringe: 5cc insulin

Practical Instructions

1. Corneal Traction

- Get well focused on the cornea by making all the necessary adjustments on the operating microscope (eye position and fixation and surgeon position).
- Pass either 8.0 or 9.0 suture deep in the stroma about 2mm in front of the intended surgical site or on the limbus.
- Fix the traction using artery forceps on the surgical drape.
2. Conjunctival Peritomy, Fornix-Based

- Balloon/infiltrate the conjunctiva with solution using insulin syringe.
- Using simple tissue forceps and conjunctival scissors, do peritomy along the limbus for 5–7mm incision, leaving 1mm limbal conjunctiva at the insertion site.
- Make posterior and lateral dissection using blunt tip conjunctival scissors.
- Milk out the fluid in the conjunctiva.
- Make very superficial cautery on vessels on the intended scleral flap site only.

3. Scleral Flap Construction

- Construct scleral flap using #15 or crescent blade, 4mm x 3mm.
- Make linear side incisions and smooth half thickness flap.
- Hold the flap at the edge with colibri during dissection.
- Extend the flap tunnel centrally to the posterior clear cornea for 1–1.5mm, leaving the sides.

4. Pre-Placed Sutures

- Apply one or two sutures at the posterior edges of the scleral flap before excising corneo-scleral block.
- Pass the sutures within the scleral flap thickness and pass radially.

5. Paracentesis

- Do one side port entry using sharp blade at your convenient site.
- Make your entry parallel to the iris and point towards the periphery, not directed to the pupil.
- Let out some aqueous fluid if the IOP is high or deepen the AC with solution if the AC is shallow.

6. Posterior Sclerotomy

- Using either blade or Kelly punch, make posterior scerotomy/corneotomy. 2mm x 2mm is large enough.
- Use Vannus scissors to excise the anterior and posterior edges of the flap, when you do block excision.
- Avoid posterior extension of the incision that may get you into the vitreous cavity.
- Hold and pull the scleral up and down while doing the procedure.

7. Peripheral Iridectomy (PI)

- Using colibri, pull out the iris below the opening.
- Take small excision.
- Make sure it is full thickness by looking at the excised tissue or looking at the iridectomy site.
- Wash out all the iris pigments.
- Always watch the pupil not to make sector iridectomy and make it round after PI.
8. Scleral Flap Closure

- Using the pre-placed suture(s), close the flap as soon as possible.
- Close the flap preferably with three sutures, make either two or all releasable.
- Pay attention to the well alignment of the flap closure to avoid gapping or astigmatism.
- Check the amount of aqueous flow before completion of suturing and add more stitches if there are overflow sites after deepening the AC through the side port with solution.
- Bury notes to avoid overlying conjunctival perforation.
- Trim suture knot edges.
- Check the amount of aqueous flow after deepening the AC with solution.
- Add more suture(s) at site(s) of over flow.

9. Conjunctival Flap Closure

- Pull the peritomy to the limbus and identify sites where the sutures are to be applied.
- To make buried note, start passing the needle from the inside of the peritomy flap.
- Water-tight closure can be secured with two wing/side sutures and one mattress at the middle.
- The mattress is done by suturing the conjunctival flap at the middle with the remaining limbal conjunctiva.
- Form bleb by deepening the AC through the side-port and pressing at the posterior edge of the scleral flap site.
- Check for water-tightness using weckcell.
- Apply more sutures for leaking site(s).

10. Anterior Chamber Deepening and Bleb Formation

- Deepen the AC with solution through the side port.
- Form diffuse bleb by applying gentle pressure at the posterior edge of the flap.
- Reform the AC again and assess the level of the IOP, preferably around 20mm Hg.

<table>
<thead>
<tr>
<th>Wet Lab Practice</th>
<th>Number of Practice Weeks</th>
<th>Model</th>
<th>Number of Eyes per Resident</th>
<th>Topic</th>
<th>Video Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>IX</td>
<td>8</td>
<td>Pig Eyes</td>
<td>8</td>
<td>Corneal Traction, Conjunctival Peritomy, Fornix-Based, Scleral Flap Construction, Pre-Placed Sutures, Paracentesis, Posterior Sclerotomy, Peripheral Iridotomy (PI), Scleral Flap Closure, Conjunctival Flap Closure, Anterior Chamber Deepening and Bleb Formation</td>
<td>Video Twelve: Perform 8 repeated practices by rotating each pig eye, and then record using the 5th eye</td>
</tr>
</tbody>
</table>

References

1. http://www.icoph.org/
2. http://www.icoph.org/resources.html
5. OSSCAR: http://simulatedocularsurgery.com/simulation/cataracts/
6. https://cybersight.org/
## Checklists

### CHECKLIST FOR SKILL DEMONSTRATION

**Scleral Tunnel Wound Construction**

<table>
<thead>
<tr>
<th>Practice design:</th>
<th>Wet Lab</th>
<th>Dry Lab</th>
<th>Simulator</th>
<th>Patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resident's Name:</td>
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<tr>
<td>Date:</td>
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</tr>
<tr>
<td>Title of the Practice: <strong>SCLERAL TUNNEL WOUND CONSTRUCTION</strong></td>
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<tr>
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<td>Date:</td>
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<tr>
<td>Sample Eye Used:</td>
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<td>Signature:</td>
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</tr>
<tr>
<td>Type of Skill Demonstration:</td>
<td>Whole Part Whole</td>
<td></td>
<td>Four Component Approach</td>
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<td>Date:</td>
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<td>Sample Eye Used:</td>
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<table>
<thead>
<tr>
<th>S. NO</th>
<th>STEPS / CRITERIA</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Explained the applied anatomy related to scleral tunnel wound location</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Verbally described the approach of tunnel construction – advantage/disadvantage</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>3</td>
<td>Adjusted the OPMI focus and field of view correctly for the site of surgery</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Make a correct scleral groove incision using what? (green needle, crescent)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>5</td>
<td>Create a scleral tunnel with the crescent knife to the level of clear cornea</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>6</td>
<td>Complete the tunnel nasally and temporally using crescent knife</td>
<td></td>
<td></td>
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<tr>
<td>7</td>
<td>Advance the crescent anteriorly in the cornea going slightly uphill</td>
<td></td>
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<tr>
<td>8</td>
<td>Inject viscoelastic into the tunnel and assessed the tunnel design</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Inserted keratome knife and cut through the Descemet's membrane to enter anterior chamber</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Advance the keratome knife parallel to the iris plane until the shoulders of the knife passed the internal edges of the incision</td>
<td></td>
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</tr>
</tbody>
</table>

**Subtotal**

**SCORE (out of 100)**

**Total number of practices performed per session (recorded)**

**Global Rating:** Dexterity, fluidity of the steps, avoidance of unnecessary actions, timely correction of mistakes, total duration of skill practice, improvement with repeated practice, efficiency of resource, respect for tissue

1 2 3 4 5

**Further comments:**
Detail of the steps to be demonstrated during the facilitation and assessment (to be expanded)

- **Step 1 to 3**: Includes describing the materials to use and parts of the crescent and keratome knife design.
- **Step 4**: 2mm behind the limbus, about 8.5mm in length and preferably smile in shape.
- **Step 5 and 6**: Cutting manner of crescent = inside out with outer \( \frac{2}{3} \) - \( \frac{2}{3} \) of the blade, holding the crescent parallel to sclera plane, adjusting the knife according to progress.
- **Step 9**: Keratome introduced safely at the external wound, slid through the tunnel without tissue engagement, directed the tip towards the center of the lens initially, fashioned the internal flap in outside-in motion.
## CHECKLIST FOR SKILL DEMONSTRATION

### Corneal Limbal Wound Suturing

<table>
<thead>
<tr>
<th>Practice design:</th>
<th>Wet Lab □</th>
<th>Dry Lab □</th>
<th>Simulator □</th>
<th>Patient □</th>
</tr>
</thead>
</table>

### Resident’s Name: ___________________________  Date: ___________________________

### Title of the Practice: **CORNEAL LIMBAL WOUND SUTURING**  Sample Eye Used: ___________________________

### Skill Facilitator: ___________________________  Signature: ___________________________

### Type of Skill Demonstration: Whole Part Whole □  Four Component Approach □

<table>
<thead>
<tr>
<th>S. NO</th>
<th>STEPS / CRITERIA</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Discusses type of wound suturing technique and suture knot</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Selection and preparation of instruments and sutures for wound repair</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Adjusted the OPMI focus and field of view correctly for the site of surgery and followed rules of conduct</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>First interrupted wound suture applied with three throw followed by 2nd and 3rd securing throw</td>
<td></td>
<td></td>
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<tr>
<td>5</td>
<td>The wound was initially approximated with anchoring sutures along the width of the wound using landmarks</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>6</td>
<td>Wound closure completed with evenly spaced sutures of equal length and proper tissue depth</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>7</td>
<td>Wound sealing confirmed by injecting air or saline using fine cannula and suture revised based on the finding</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>8</td>
<td>Prominent suture tip trimmed and rotated towards the sclera side</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Suturing needle placed in a easily accessible part of the drape or head in a manner ready for next picking</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Global Rating:** Dexterity, fluidity of the steps, avoidance of unnecessary actions, timely correction of mistakes, total duration of skill practice, improvement with repeated practice, efficiency of resource, respect for tissue  1   2   3   4   5

**Further comments:** ………………………………………………………………………………………………………………………………………………………………………

**Subtotal**

**SCORE (out of 100)**

**Total number of practices performed per session (recorded)**
### Checklist for Skill Demonstration

#### Entering the Wound via the Tunnel

<table>
<thead>
<tr>
<th>Practice design:</th>
<th>Wet Lab</th>
<th>Dry Lab</th>
<th>Simulator</th>
<th>Patient</th>
</tr>
</thead>
</table>

**Resident’s Name:**

**Date:**

**Title of the Practice:** **ENTERING THE WOUND VIA THE TUNNEL**

**Skill Facilitator:**

**Sample Eye Used:**

**Signature:**

**Type of Skill Demonstration:** Whole Part Whole

<table>
<thead>
<tr>
<th>S. NO</th>
<th>STEPS / CRITERIA</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Adjust the microscope very well so that the wound incision is very visible</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Insert OVD into the tunnel for smooth insertion of the keratome</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Insert the keratome and aim to the macula on down stroke, no upstroke</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Point down and enter the anterior chamber parallel to the pupillary plane, observe gush of fluid</td>
<td></td>
<td></td>
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<tr>
<td>5</td>
<td>Proper extension of the incision nasally and temporally</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Inspect for any Descemet tear</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Subtotal**

**SCORE (out of 100)**

**Total number of practices performed per session (recorded)**

**Global Rating:** Dexterity, fluidity of the steps, avoidance of unnecessary actions, timely correction of mistakes, total duration of skill practice, improvement with repeated practice, efficiency of resource, respect for tissue

1 2 3 4 5

**Further comments:..............................................................................................................................................................................**

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# CHECKLIST FOR SKILL DEMONSTRATION

## Capsulotomy

<table>
<thead>
<tr>
<th>Practice design:</th>
<th>Wet Lab</th>
<th>Dry Lab</th>
<th>Simulator</th>
<th>Patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resident’s Name:</td>
<td></td>
<td></td>
<td>Date:</td>
<td></td>
</tr>
<tr>
<td>Title of the Practice: <strong>CAPSULOTOMY</strong></td>
<td></td>
<td></td>
<td>Sample Eye Used:</td>
<td></td>
</tr>
<tr>
<td>Skill Facilitator:</td>
<td></td>
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<td>Signature:</td>
<td></td>
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<tr>
<td>Type of Skill Demonstration:</td>
<td>Whole Part Whole</td>
<td></td>
<td>Four Component Approach</td>
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<tr>
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<th>STEPS / CRITERIA</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Adjust the microscope very well so that anterior capsule is well focused</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Inject air into the anterior chamber</td>
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<tr>
<td>3</td>
<td>Inject trypan blue</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Inject OVD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Proper use cystotome needle or utrata forceps to do anterior capsulotomy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Proper size of capsulotomy, no extension</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Global Rating**: Dexterity, fluidity of the steps, avoidance of unnecessary actions, timely correction of mistakes, total duration of skill practice, improvement with repeated practice, efficiency of resource, respect for tissue

1 2 3 4 5

**Further comments**: 

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### CHECKLIST FOR SKILL DEMONSTRATION

#### Hydrodissection

<table>
<thead>
<tr>
<th>Practice design:</th>
<th>Wet Lab</th>
<th>Dry Lab</th>
<th>Simulator</th>
<th>Patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resident’s Name:</td>
<td>Date:</td>
<td>Sample Eye Used:</td>
<td>Signature:</td>
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</tr>
<tr>
<td>Title of the Practice: <strong>HYDRODISSECTION</strong></td>
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<tr>
<td>Skill Facilitator:</td>
<td>Type of Skill Demonstration: Whole Part Whole, Four Component Approach</td>
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</table>

<table>
<thead>
<tr>
<th>S. NO</th>
<th>STEPS / CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduce an irrigating cannula through the paracentesis</td>
</tr>
<tr>
<td>2</td>
<td>Place the tip of the cannula just under the capsule at 6-o’clock position</td>
</tr>
<tr>
<td>3</td>
<td>Irrigate fluid gently under the capsule until you see fluid perfusing under the nucleus</td>
</tr>
<tr>
<td>4</td>
<td>Extend the cannula about 1mm-2mm under the capsule</td>
</tr>
<tr>
<td>5</td>
<td>Hydrodissect gently at three and nine o’clock until you see the upper pole of the nucleus prolapse</td>
</tr>
</tbody>
</table>

**Subtotal**

**SCORE (out of 100)**

**Total number of practices performed per session (recorded)**

**Global Rating:** Dexterity, fluidity of the steps, avoidance of unnecessary actions, timely correction of mistakes, total duration of skill practice, improvement with repeated practice, efficiency of resource, respect for tissue

1 2 3 4 5

**Further comments:**

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### Checklist for Skill Demonstration

**Nucleus Expression and Extraction**

<table>
<thead>
<tr>
<th>Practice design:</th>
<th>Wet Lab</th>
<th>Dry Lab</th>
<th>Simulator</th>
<th>Patient</th>
</tr>
</thead>
</table>

**Resident’s Name:** 

**Title of the Practice:** **NUCLEUS EXPRESSION AND EXTRACTION**

**Skill Facilitator:** 

**Type of Skill Demonstration:** Whole Part Whole

**Date:** 

**Sample Eye Used:** 

**Signature:** 

**Sample Eye Used:**
- Wet Lab
- Dry Lab
- Simulator
- Patient

<table>
<thead>
<tr>
<th>S. NO</th>
<th>STEPS / CRITERIA</th>
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<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Adjust the focus of the operating microscope</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Insert OVD into the anterior chamber below and above the nucleus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Make sure the nucleus is rotating freely</td>
<td></td>
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<tr>
<td>4</td>
<td>Use either irrigating Vectis or Vectis loop to extract the lens</td>
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<tr>
<td>5</td>
<td>Be careful and gentle not to touch the corneal endothelium and other intraocular structures while removing the nucleus</td>
<td></td>
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</tr>
<tr>
<td>6</td>
<td>Make sure the whole nucleus is removed and there are no nuclear fragments left</td>
<td></td>
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</tr>
</tbody>
</table>

**Subtotal**

**SCORE (out of 100)**

**Total number of practices performed per session (recorded)**

**Global Rating:** Dexterity, fluidity of the steps, avoidance of unnecessary actions, timely correction of mistakes, total duration of skill practice, improvement with repeated practice, efficiency of resource, respect for tissue

**Further comments:**

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**Cortex Removal**

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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Make sure the irrigation flow rate is appropriate to maintain the anterior camber but doesn’t create too much turbulence in the eye prior to insertion into the wound</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2</td>
<td>Once in the eye ensure adequate suction with the Simcoe cannula by testing a readily available piece of cortex; if inadequate suction, change the cannula immediately</td>
<td></td>
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<tr>
<td>3</td>
<td>Adjust the microscope/patient’s head as needed to ensure adequate red reflex and that all portions of capsular bag (anterior capsular flap, posterior capsule) can be identified</td>
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</tbody>
</table>

Subtotal

SCORE (out of 100)

Total number of practices performed per session (recorded)

**Global Rating:** Dexterity, fluidity of the steps, avoidance of unnecessary actions, timely correction of mistakes, total duration of skill practice, improvement with repeated practice, efficiency of resource, respect for tissue

1  2  3  4  5
### Checklist for Skill Demonstration

#### IOL Insertion and Implantation

<table>
<thead>
<tr>
<th>Practice design:</th>
<th>Wet Lab</th>
<th>Dry Lab</th>
<th>Simulator</th>
<th>Patient</th>
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<tbody>
<tr>
<td>Resident’s Name:</td>
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<td>Date:</td>
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<tr>
<td>Title of the Practice: <strong>IOL INSERTION AND IMPLANTATION</strong></td>
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<tr>
<td>Skill Facilitator:</td>
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<tr>
<td>Signature:</td>
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</tr>
<tr>
<td>Type of Skill Demonstration:</td>
<td>Whole Part Whole</td>
<td></td>
<td>Four Component Approach</td>
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<tr>
<td>Sample Eye Used:</td>
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#### Steps / Criteria

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<tr>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Make sure the operating microscope is adjusted to give a full field view of the eye, ensure good visibility of the anterior chamber, anterior capsule and the wound incision</td>
</tr>
<tr>
<td>2</td>
<td>Insert OVD into the anterior chamber or use the ACM</td>
</tr>
<tr>
<td>3</td>
<td>Advance the IOL through the incision</td>
</tr>
<tr>
<td>4</td>
<td>Place the leading haptic into position</td>
</tr>
<tr>
<td>5</td>
<td>Bring the IOL optic into the pupil</td>
</tr>
<tr>
<td>6</td>
<td>Flex the trailing haptic and place into position using tying forceps or use dialer to rotate the IOL clockwise</td>
</tr>
</tbody>
</table>

#### Global Rating:
Dexterity, fluidity of the steps, avoidance of unnecessary actions, timely correction of mistakes, total duration of skill practice, improvement with repeated practice, efficiency of resource, respect for tissue

#### Score (out of 100)

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#### Subtotal

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#### Total number of practices performed per session (recorded)

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Further comments: ......................................................................................................................................................................................
## Checklist for Skill Demonstration
### Wound Inspection and Closure of Wound

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<td>Date:</td>
<td>Sample Eye Used:</td>
<td>Signature:</td>
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<tr>
<td>Title of the Practice: <strong>WOUND INSPECTION AND CLOSURE OF WOUND</strong></td>
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<tr>
<td>Type of Skill Demonstration:</td>
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<td></td>
<td>Four Component Approach</td>
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<tr>
<td>1</td>
<td>Test the wound for leakage by irrigating fluid through the paracentesis</td>
</tr>
<tr>
<td>2</td>
<td>If there is leakage, hydrate the incisions with irrigating fluid or apply one stitch at the wound site</td>
</tr>
<tr>
<td>3</td>
<td>Reapproximate the conjunctiva at the limbus either with cautery or stitches</td>
</tr>
</tbody>
</table>

<table>
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</tbody>
</table>

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1 2 3 4 5

**Further comments:**

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## CHECKLIST FOR SKILL DEMONSTRATION

### Trabeculectomy

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</thead>
<tbody>
<tr>
<td>1</td>
<td>Explained the applied anatomy related to trabeculectomy</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2</td>
<td>Verbally described the surgical approach of trabeculectomy</td>
<td></td>
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</tr>
<tr>
<td>3</td>
<td>Get well focused on the cornea by making all the necessary adjustments on the operating microscope, eye position and fixation and surgeon position</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td><strong>Corneal traction</strong></td>
<td></td>
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</tr>
<tr>
<td>4</td>
<td>Pass either 8.0 or 9.0 suture deep in the stroma for about 2mm in front of the intended surgical site or on the limbus</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>5</td>
<td>Fix the traction using artery forceps on the surgical drape</td>
<td></td>
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<tr>
<td></td>
<td><strong>Conjunctival peritomy, fornix-based</strong></td>
<td></td>
<td></td>
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<tr>
<td>6</td>
<td>Balloon/infiltrate the conjunctiva with solution using insulin syringe</td>
<td></td>
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<tr>
<td>7</td>
<td>Using simple tissue forceps and vannus do peritomy along the limbus for 5–7mm incision, leaving 1mm limbal conjunctiva at the insertion site</td>
<td></td>
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<tr>
<td>8</td>
<td>Make posterior and lateral dissection using blunt tip conjunctival scissors</td>
<td></td>
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<tr>
<td>9</td>
<td>Make very superficial cautery on vessels on the intended scleral flap site only</td>
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<tr>
<td>10</td>
<td>Milk out the fluid in the conjunctiva</td>
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<tr>
<td></td>
<td><strong>Scleral flap construction</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Construct scleral flap using #15 blade or crescent, 4mm x 3mm</td>
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</tr>
<tr>
<td>12</td>
<td>Make linear side incisions and smooth half thickness flap</td>
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</tr>
<tr>
<td>13</td>
<td>Hold the flap at the edge with colibri during dissection</td>
<td></td>
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</tr>
<tr>
<td>14</td>
<td>Extend the flap tunnel centrally to the posterior clear cornea for 1–1.5mm, leaving the sides</td>
<td></td>
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<tr>
<td>S. NO</td>
<td>STEPS / CRITERIA</td>
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</tr>
<tr>
<td></td>
<td><strong>Pre-placed sutures</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>15</td>
<td>Apply one or two sutures at the posterior edges of the scleral flap before excising corneoscleral block</td>
<td></td>
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<tr>
<td>16</td>
<td>Pass the sutures within the scleral flap thickness and pass radially</td>
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</tr>
<tr>
<td></td>
<td><strong>Paracentesis</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>17</td>
<td>Do one side port entry using sharp blade at your convenient site</td>
<td></td>
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<tr>
<td>18</td>
<td>Make your entry parallel to the iris and point towards the periphery, not directed to the pupil</td>
<td></td>
<td></td>
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<tr>
<td>19</td>
<td>Let out some aqueous fluid if the IOP is high or deepen the AC with solution if the AC is shallow</td>
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<tr>
<td></td>
<td><strong>Posterior sclerotomy</strong></td>
<td></td>
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</tr>
<tr>
<td>20</td>
<td>Using either blade or Kelly punch, make posterior sicerotomy/corneotomy – 2mm x 2mm is large enough</td>
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</tr>
<tr>
<td>21</td>
<td>Use vannus scissors to excise the anterior and posterior edges of the flap when you do block excision</td>
<td></td>
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<tr>
<td>22</td>
<td>Avoid posterior extension of the incision that may get you into the vitreous cavity</td>
<td></td>
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</tr>
<tr>
<td>23</td>
<td>Hold and pull the scleral up and down while doing the procedure</td>
<td></td>
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<tr>
<td></td>
<td><strong>Peripheral iridectomy (PI)</strong></td>
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<tr>
<td>24</td>
<td>Using colibri, pull out the iris below the opening</td>
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<tr>
<td>25</td>
<td>Take small excision</td>
<td></td>
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<tr>
<td>26</td>
<td>Make sure it is full thickness by looking at the excised tissue or looking at the iridectomy site</td>
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</tr>
<tr>
<td>27</td>
<td>Wash out all the iris pigments. Always watch the pupil not to make sector iridectomy and make it round after PI</td>
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<tr>
<td></td>
<td><strong>Scleral flap closure</strong></td>
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</tr>
<tr>
<td>28</td>
<td>Using the pre-placed suture(s), close the flap as soon as possible</td>
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<tr>
<td>29</td>
<td>Close the flap preferably with three sutures, make either two or all releasable</td>
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<tr>
<td>30</td>
<td>Good alignment of the flap closure to avoid gapping or astigmatism</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>31</td>
<td>After deepening the AC through the side port with solution, check the amount of aqueous flow and add more stitches(s) if there are over flow sites</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>Bury notes to avoid overlying conjunctival perforation, trim suture knot edges</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Check the amount of aqueous flow after deepening the AC with solution, add more suture(s) at site(s) of overflow</td>
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</table>
### ANNEX V

<table>
<thead>
<tr>
<th>S. NO</th>
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<tbody>
<tr>
<td></td>
<td><strong>Conjunctival flap closure</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>Pull the peritomy to the limbus and identify sites where sutures are to be applied</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>Make buried note, start passing the needle from the inside of the preitomy flap</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>36</td>
<td>Water-tight closure secured with two wing/side sutures and one mattress at the middle by suturing the conjunctival flap at the middle with the remaining limbal conjunctiva</td>
<td></td>
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</tr>
<tr>
<td>37</td>
<td>Form bleb by deeping the AC through the side-port and pressing at the posterior edge of the scleral flap site</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>38</td>
<td>Check for water-tightness using weckcell and apply more sutures for leaking site(s)</td>
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<tr>
<td></td>
<td><strong>Anterior chamber deepening and bleb formation</strong></td>
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</tr>
<tr>
<td>39</td>
<td>Deepen the AC with solution through the side port</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>40</td>
<td>Form diffuse bleb by applying gentle pressure at the posterior edge of the flap</td>
<td></td>
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<tr>
<td>41</td>
<td>Reform the AC again and assess the level of the IOP, check to make it around 20mmHg</td>
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</table>

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**Subtotal**

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**Further comments:**

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## Wet Lab Schedule

<table>
<thead>
<tr>
<th>Wet Lab Practice</th>
<th>Practice Weeks</th>
<th>Model</th>
<th>Eyes per Resident</th>
<th>Topic</th>
<th>Video Assignment</th>
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<tbody>
<tr>
<td>I &amp; II</td>
<td>2</td>
<td>None</td>
<td>None</td>
<td>Surgical Microscope Basics / Use of Microscope Identifying and Using Key Microsurgical Instruments</td>
<td>None</td>
</tr>
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</table>
| III & IV         | 2              | Pig Eyes | 2-3          | Conjunctival Peritomy Wound Construction: Scleral Tunnel, Sclerocorneal and Clear Corneal Incisions | Video One: 4 conjunctival peritomies performed one on each quadrant of 1 pig eye (to be recorded after 10 peritomies have been practiced prior to recording)  
Video Two: 4 consecutive wound constructions with scleral tunnelling performed on each quadrant of 1 pig eye (to be recorded after 12 scleral wounds have been created)  
Video Three: 6 clear corneal incisions performed at 6 different clock hours of 1 pig eye |
| V                | 3              | Pig Eyes | 2                  | Suture Technique, Knots, The Different Types of Suture Materials Used and Approaching Corneal Repair | Video Four: Perform 10 corneoscleral passes with knot tying  
Video Five: Repair 1 limbus and scleral on pig eye using clear corneal laceration |
| VI               | 2              | Pig Eyes | 2                  | Paracentesis, Entering the Main Wound, Viscodelastic Insertion         | Video Six: 20 paracentesis and entering with cannula through para 20 times, insertion of OVD on final time  
Video Seven: 4 keratome incisions performed, one on each quadrant of 1 pig eye eye (to be recorded after 10 have been practiced prior to recording) |
| VII              | 8              | Pig Eyes | 10                | Anterior Capsulotomy, Hydrodissection, and Nucleus Extraction         | Video Eight: 30 repetitions of dominant and non-dominant instrument movement in AC  
Video Nine: 10 Capsulorrhexis  
Video Ten: 10 Hydrodissections; 10 Nucleus rotations out of the bag |
| VIII             | 4              | Pig Eyes | 5                  | Cortex Removal, IOL Insertion and Implantation, Wound Check and Closure of Wound | Video Eleven: 10 I/A with Simcoe; 10 IOL insertions in the bag, with 10 wound checks; 1 wound suture recorded after 10 practices |
| IX               | 8              | Pig Eyes | 8                  | Corneal Traction, Conjunctival Peritomy, Fornix-Based, Scleral Flap Construction, Pre-Placed Sutures, Paracentesis, Posterior Sclerotomy, Peripheral Iridotomy (PI), Scleral Flap Closure, Conjunctival Flap Closure, Anterior Chamber Deepening and Bleb Formation | Video Twelve: Perform 8-repeated practice by rotating each pig eye, and then record using the 5th eye |
The Orbis MSICS Wet Laboratory Curriculum

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Dr. Antonio Jaramillo, Head of Clinical Service, Flying Eye Hospital

This curriculum is designed to provide wet lab training in Manual Small Incision Cataract Surgery (MSICS) for residents and junior ophthalmologists.

MSICS has been recognized worldwide as a viable alternative to phacoemulsification for cataract surgery in resource constrained areas. It also serves as a valuable intermediary step to mastering phacoemulsification surgery.

This curriculum covers 10 sessions, as follows:
1. Wet Lab Session One: Introduction to MSICS
2. Wet Lab Session Two: Wound Construction
3. Wet Lab Session Three: Paracentesis and Viscoelastic/ Anterior Chamber Maintainer
4. Wet Lab Session Four: Capsulorrhexis, Hydrodissection and Nucleus Extraction
5. Wet Lab Session Five: Intraocular Lens
6. Wet Lab Session Six: Suturing and Wound Closure
7. Wet Lab Session Seven: Pulling it all Together 1: MSICS Start to Finish
8. Wet Lab Session Eight: Pulling it all Together 2: MSICS Start to Finish
9. Wet Lab Session Nine: Managing Complications 1: Poor Wound Construction and Anterior Chamber Instability
10. Wet Lab Session Ten (Optional): Managing Complications 2: Vitreous Loss and Capsular Tears

Overall Objective of the Wet Lab Program

By the completion of all nine sessions, residents or junior consultants will be able to:
1. Explain and demonstrate how to use the surgical microscope, including use of the foot petal.
2. Identify key microsurgical instruments and supplies, and demonstrate their use.
3. Describe the “time-out” procedure performed in the OR prior to cataract surgery.
4. Demonstrate competency in simulated MSIC surgery, as assessed by the Ophthalmic Simulated Surgical Competency Assessment Rubric (OSSCAR), adapted from internationally recognized ICO-OSCAR (see Appendix 1).
Training Ratios

Ideally, the course will have one trainee per wet lab station per session, where a wet lab station includes a surgical microscope and necessary microsurgical instruments. For example, if the host facility has a total of four wet lab stations, the ideal ratio of trainees to trainers will be 4:1 (or two trainers, if available). Each session is approximately 4-6 hours, depending on the content and the size of the group.

Criteria for Trainer or Mentor

The ideal main trainer (referred to as Trainer A in this course outline):

✔ Is at minimum a fellow, but ideally a staff ophthalmologist with MSICS experience, who is involved in a residency program and can easily articulate technical maneuvers to beginner ophthalmologists.
✔ Has experience performing MSICS and is comfortable with all steps.
✔ Has experience teaching residents and beginners who may have little to no surgical experience.
✔ Is able to provide interactive lectures and hands-on instruction in the wet lab.
✔ Has the ability to do simple troubleshooting with wet lab equipment (e.g., microscopes).
✔ Is a flexible problem-solver if resources or infrastructure fails (e.g., back-up plans for teaching and practicing if the generator fails and there is a black out).

Wet Lab Sessions

Wet Lab Session One: Introduction to MSICS

Objectives:
1. Explain and demonstrate how to use the surgical microscope, including use of the foot petal.
2. Identifying key microsurgical instruments and supplies, and explain their use.
3. Describe the “time-out” procedure performed in the OR prior to cataract surgery.
4. Describe all information on an IOL calculation sheet (see Appendix 2).
5. Describe all steps of MSICS cataract surgery (Figure 1).

Lecture I: Surgical Microscope Basics and MSICS Surgical Instruments

By the completion of the lecture, trainees should be able to:
• Place themselves in a comfortable and ergonomic position at the surgical microscope.
• Know their pupillary distance.
• Know how to focus, zoom, X-Y, and center their surgical microscopes manually and with the foot pedals.
• Able to name and visually identify the surgical instruments needed for MSICS and describe their use.

Lecture II: Overview of MSICS Steps and Detailed Technique/Tips for Conjunctival Peritomy and Scleral Tunnels

By the completion of the lecture, trainees should be able to:
• Name and describe all steps of the MSICS procedure.
• Describe the instruments needed, location, and preferred technique for conjunctival peritomy and creation of the scleral tunnel.
• Describe how to prevent and manage poor hemostasis, premature entry, shallow wounds, and button-holes.
Lecture III: Biometry and IOL Selection

By the completion of the lecture, trainees should be able to:

- Understand the basic lens formulas and understand the theory behind them.
- Understand and perform A scans and keratometry by multiple methods.
- Troubleshoot and perform quality control with IOL selection (e.g., comparing the axial length of both eyes, checking the target refraction, checking for appropriate lens formula).
- Describe different types of lens choices (acrylic, PMMA, foldable, one piece, three piece, anterior chamber IOLs) and when to use each type.
- Identify the A constant and how to account for this in IOL selection.

Wet Lab: Learning MSICS Step by Step

- Preparation of the Eye
  - Use of microscope
  - Proper betadine
  - Lid speculum
  - Traction suture

- Wound Construction
  - Conjunctival incision
  - Cauterizing the epi-sclera
  - Scleral tunnel formation

- Paracentesis & Viscoelastic

- Anterior Capsulorhexis, Options:
  - Can opener
  - CCC (while not essential for SICS, CCC greatly adds to surgical safety, less PC breaks, and efficacy; it is also the pre-requisite for learning phacoemulsification, so should be included in training).

- Anterior Chamber Maintainer (ACM)

- Hydrodissection & Expression (of the lens out of the capsular bag)

- Extracapsular Technique: Expression of Lens out of the Eye. Options include:
  - A glide & hydroexpression
  - Irrigating Vectis technique
  - Simcoe Cannula technique
  - Plain Vectis technique

- Cortical Cleanup

- IOL Insertion & Implantation

- Wound Inspection & Closure
  - Includes scleral wound (possible need to suture)
  - Conjunctiva

Figure 1: Steps of MSICS
Wet Lab Session Two: Wound Construction

Objectives:
1. Explain and describe preparation of the eye:
   a. Proper betadine
   b. Lid speculum
   c. Traction suture
2. Demonstrate wound construction, including:
   a. Completion of 4-8 conjunctival peritomies (4 per pig eye)
   b. Completion of 4-8 scleral tunnels
   c. Entrance of 4-8 wounds into the anterior chamber with the keratome; through the scleral tunnel

Wet Lab Session Three: Paracentesis and Viscoelastic or Anterior Chamber Maintainer

The objective depends on the hospital's preferred technique. It's also possible to train in both if there is demand.

Objectives:
1. Completion of at least 4 paracenteses.
2. Completion of filling the anterior chamber with viscoelastic (1).
3. Practice entering and exiting the eye with cannulas and the sinskey hook until one is able to do so without difficulty (suggestion 20 times).
4. Practice setting up anterior chamber maintainer and placing in the eye.
5. Completion of 4 conjunctival peritomies (4 per practice eye).
6. Completion of 4 scleral tunnels.
7. Entrance of 4 wounds into the anterior chamber with the keratome through the scleral tunnel.

Lecture IV: Detailed Technique/Tips for Paracentesis, Entering the Main Wound, Viscoelastic Insertion, and Anterior Chamber Maintainers

By the completion of the lecture, trainees should be able to:
- Describe instruments needed, location, and preferred technique for creation of the paracentesis, entrance of the main wound, viscoelastic insertion, and use of anterior chamber maintainers.
- Be aware of the importance of the angle and location of the paracentesis.
- Describe different types of viscoelastic (cohesive, dispersive, dual) and when they should be used.
- Be aware of the Blumenthal technique and optional use of an anterior chamber maintainer.
ANNEX W

Wet Lab Session Four: Capsulorhexis, Hydrodissection, and Nucleus Extraction

Objectives:
1. To perform at least 10 capsulorhexis:
   a. Can opener method
   b. Continuous Curvilinear Capsulorhexis (CCC) (while not essential for SICS, CCC greatly adds to surgical safety, less PC breaks, and efficacy; it is also the pre-requisite for learning phacoemulsification, so should be included in training)
   c. Recommend continuous curvilinear on artificial eyes and can opener on pig eyes
2. Demonstrate ability to perform hydrodissection.
3. Demonstrate ability to perform expression of the lens out of the capsular bag.
4. Extracapsular technique, expression of lens out of the eye. Options include:
   a. A glide & hydroexpression
   b. Irrigating Vectis technique
   c. Simcoe Cannula technique
   d. Plain Vectis technique
5. Completion of all steps of MSICS through nucleus extraction.

Lecture V: Detailed Technique/Tips for Anterior Capsulorrhexis, Hydrodissection, and Nucleus Extraction

By the completion of the lecture, trainees should be able to:
- Describe the preferred method for the creation of a continuous curvilinear capsulorrhexis, can-opener capsulotomy, and V capsulotomy.
- Describe the advantages and disadvantages for each type of capsulorrhexis.
- Understand basic vector forces when creating a capsulorrhexis.
- Describe proper technique for hydrodissection.
- Describe the various methods for nucleus extraction including use of viscoelastic, irrigating and non-irrigating vectus, irrigation with cannula, and Simcoe irrigation.

Wet Lab Session Five: Intraocular Lens (IOLs)

Objectives:
1. Completion of filling the anterior chamber and capsular bag with viscoelastic (4, may use lubricant to simulate viscoelastic).
2. Completion of insertion and placement of IOL (4, may reuse lenses).

Lecture VI: Detailed Technique/Tips for Cortex Removal, IOL Insertion, Irrigation/Aspiration, Closure

By the completion of the lecture, trainees should be able to:
- Understand the fluidics of irrigation/aspiration with the Simcoe.
- Describe the technique for cortex removal and viscoelastic removal.
- Describe the technique for handling, insertion, and proper placement of an intraocular lens.
- Understand the importance of proper IOL placement and describe the possible complications associated with poor or incorrect placement.
- Describe the basic types of IOLs by location and material.
- Describe how to check for stable wound closure at the end of the case.
- Describe the options for conjunctival closure (pull into place, cautery, suture).
Annex W

Wet Lab Session Six: Suturing and Wound Closure

Objectives:
1. Learning to load the needle under the microscope.
2. Practice properly handling instruments.
3. Practice properly handling tissue.
4. Completion of suturing at least 3 cornea lacerations (1 straight, 1 jagged, 1 stellate).
5. Completion of suturing at least 2 scleral wounds.
6. Completion of suturing conjunctiva.
7. Practice three types of knots (3-1-1, slip, figure-of-eight).

Lecture VII: Suture Technique, Knots, and Approaching Corneal Laceration Repair

By the completion of the lecture, trainees should be able to:
- Describe the preferred technique for corneal and scleral suturing with special focus on loading the needle under the microscope, the location of the needle in the forceps, handling of tissue, angle of needle entry and exit, preferred length and depth of sutures.
- Describe the throws and when to use 3-1-1, slip, and figure-of-eight knots.
- Name types of suture (braided vs monofilament, dissolvable vs permanent, prolene, nylon, vicryl, plain gut, gortex), describe their purpose, and give examples of their use.
- Name types of needles (spatulated vs cutting, curved vs straight), describe their purpose, and give examples of their use.
- Be aware of how to approach corneal and scleral laceration repairs in straight, jagged, or stellate configurations.

Wet Lab Session Seven: Pulling it All Together 1: MSICS Start to Finish

Objectives:
1. Knowing and performing all surgical steps of MSICS (Figure 1).

Wet Lab Session Eight: Pulling it All Together 2: MSICS Start to Finish

Objectives:
1. Knowing and performing all surgical steps of MSICS (Figure 1).
Wet Lab Session Nine: Managing Complications 1

Objectives:
1. Practice managing surgical complications:
   a. Poor wound construction
   b. Anterior chamber instability

Lecture VIII: Management of Common Complications

By the completion of the lecture, trainees should be able to:
- Understand how to avoid and manage capsulorhexis rents with techniques such as the Little Maneuver.
- Understand how to avoid and manage vitreous loss.
- Understand basic anterior vitrectomy.
- Describe when, if, and where to place an IOL in the case of anterior capsular tear or vitreous loss and how to choose the lens type and power.

Wet Lab Session Ten (Optional): Managing Complications 2

Note: To cover this session, residents will need to have access to a vitrector. If one is available in the operating room, the wet lab session can be conducted in the OR with artificial eyes, in order to avoid cross contamination. Refer to the following link for demonstration videos related to simulation sessions related to managing complications:

http://simulatedocularsurgery.com/simulation/cataracts/ (At site go to section “Advance eyes” and selecte the video “phaco+vitrectomy.”

If there isn't a vitrectomy machine available, then deliver the lecture portion of this session only.

Objectives:
1. Practice managing surgical complications:
   a. Capsular tears
   b. Vitreous loss

Lecture IX: Management of Complex Cataracts

By the completion of the lecture, trainees should be able to:
- Know how to plan and manage surgery in white cataracts.
- Understand maneuvers to prevent an “Argentinean flag sign.”
- Know how to plan and manage surgery in traumatic cataracts.
- Know how to plan and manage surgery in cataracts with zonular loss or history of pseudoexfoliation.
## Instructional Resources

The following is a list of resources that should be read as pre-learning before the wet lab sessions begin. They can also serve as helpful resources throughout the course.

7. Tips for MSICS. Dr. Shivkumar Chandrashekharan, M.S; Cataract and IOL Services, Aravind Eye Hospital and Postgraduate Institute of Ophthalmology, India
15. Tele-medicine Wet Lab Cataract Surgery Course 2017. Instituto Regional De Oftalmologia (IRO).
18. MSICS instrument cheat sheet
22. Video Content List- Demonstration videos.
   a. [cybersight.org](http://cybersight.org)
   b. [simulatedocularsurgery.com](http://simulatedocularsurgery.com)
   c. [http://gallery.simulatedocularsurgery.com](http://gallery.simulatedocularsurgery.com)
   d. [PAAO: http://www.campuspaaoo.org](http://www.campuspaaoo.org)
   e. AAO One Network: [https://www.aao.org/clinical-education](https://www.aao.org/clinical-education)
Wet Lab Session Supplies

Each wet lab station should be outfitted with the following equipment each day:

- Clean workspace
- Disposable gloves in small, medium, and large- ideally, non-latex to avoid allergic reactions.
- Paper towels
- Water and detergent to clean instruments- ideally, distilled water to prevent rusting.
- The practice eye head, plastic casing or a piece of Styrofoam, and 3-4 pins to mount the practice eye. (These are reusable.)
- Chair- ideally one that adjusts in height
- Surgical microscope
- Instrument kit that includes the following:
  - Blunt Wescott Scissors (1)
  - 0.12 toothed forceps (1)
  - Utrata forceps (1)
  - Mosquito hemostat (1)
  - Hydrodissection cannula, 22G or 25G (1)
  - Scc syringe (2)
  - 1cc syringe (1)
  - Sinsky hook (1)
  - Simcoe with tubing (1)
  - Vectus (irrigating or non-irrigating, 1)
  - Tying forceps (2)
  - Anterior chamber maintainer with tubing (1)
  - Microsurgical needle driver (1)
  - Lens insertion forceps (optional, 1)
  - 10cc syringes (2 for AM session, 2 for PM session for injecting the vitreous if eyes are too soft, may be used for the week)

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Wet Lab Session One: Introduction to MSICS

Additional Supplies

- None

Wet Lab Session Two: Wound Construction

Additional Supplies

- Pig eyes (2 per person)
- Basic saline solution bottle (2 per person)
- Crescent blade (1 unused, per person if disposable)
- Keratome blade (1 unused, per person if disposable)
- Sideport blade (1 unused, per person if disposable)
- Saline bag (1 for AM session, 1 for PM session to inject into vitreous if eyes are too soft)
- 18G needle (2 for AM session, 2 for PM session for injecting the vitreous if eyes are too soft)
- Viscoelastic (2 per person)
- 22G anterior chamber cannula (disposable, 1 per person)
### Wet Lab Session Three: Paracentesis and Viscoelastic/ Anterior Chamber Maintainer

**Additional Supplies**
- Pig eye (1 per person; may store the eye for use on Day 3 if supplies are limited)
- Basic saline solution bottle (2 per person)
- Crescent blade (1 unused, per person if disposable, may keep for Day 3)
- Keratome blade (1 unused, per person if disposable, may keep for Day 3)
- Sideport blade (1 unused, per person if disposable, may keep for Day 3)
- Saline bag (1 per person)
- 18G needle (2 for AM session, 2 for PM session for injecting the vitreous if eyes are too soft)
- Viscoelastic (2 per person)
- 22G anterior chamber cannula (1 per person)

### Wet LabSession Four: Capsulorhexis, Hydrodissection and Nucleus Extraction

**Additional Supplies**
- Pig eye (1 per person)
- Plastic practice eyes (3 per person)
- Basic saline solution bottle (1 per person)
- Crescent blade (1 unused, per person if disposable)
- Keratome blade (1 unused, per person if disposable)
- Sideport blade (1 unused, per person if disposable)
- Saline bag (1 per person)
- 18G needle (2 for AM session, 2 for PM session for injecting the vitreous if eyes are too soft)
- Viscoelastic (2 per person)
- 5cc syringe (1 per person)
- 1cc syringe (1 per person)
- trypan blue (1 per person)
- 22G anterior chamber cannula (2 per person)
- Cystotome (2 per person, may substitute a 27G needle if necessary)

### Wet Lab Session Five: IOLs

**Additional Supplies**
- Practice eyes (2 per person)
- Basic saline solution bottle (1 per person)
- Crescent blade (1 unused, per person if disposable)
- Keratome blade (1 unused, per person if disposable)
- Sideport blade (1 unused, per person if disposable)
- Saline bag (1 per person)
- 18G needle (2 for AM session, 2 for PM session for injecting the vitreous if eyes are too soft)
- Viscoelastic (3 per person)
- 5cc syringe (1 per person)
- 1cc syringe (1 per person)
- trypan blue (1 per person)
- 22G anterior chamber cannula (2 per person)
- Cystotome (2 per person, may substitute a 27G needle if necessary)
- IOL (per person: 1 piece PMMA, 1 three-piece acrylic)
### Wet Lab Session Six: Suturing and Wound Closure

**Additional Supplies**
- Practice eyes (2 per person)
- Basic saline solution bottle (2 per person)
- Crescent blade (may use from Day 2)
- Keratome blade (may use from Day 2)
- Sideport blade (may use from Day 2)
- Viscoelastic (2 per person)
- 10-0 nylon (2 per person)
- 9-0 nylon (2 per person)
- 8-0 vicryl (1 per person)

### Wet Lab Session Seven and Eight: Pulling it All Together: MSICS Start to Finish

**Additional Supplies**
- Practice eyes (5 per person)
- Basic saline solution bottle (1 per person)
- Crescent blade (1 unused, per person if disposable)
- Keratome blade (1 unused, per person if disposable)
- Sideport blade (1 unused, per person if disposable)
- Saline bag (1 per person)
- 18G needle (2 for AM session, 2 for PM session for injecting the vitreous if eyes are too soft)
- Viscoelastic (3 per person)
- 5cc syringe (1 per person)
- 1cc syringe (1 per person)
- trypan blue (1 per person)
- 22G anterior chamber cannula (2 per person)
- Cystotome (2 per person, may substitute a 27G needle if necessary)
- IOL (per person: 1 piece PMMA, 1 three-piece acrylic)

### Wet Lab Session Nine: Managing Complications 1: Poor Wound Construction and Anterior Chamber Instability

**Additional Supplies**
- Practice eyes (2 per person)
- Basic saline solution bottle (1 per person)
- Crescent blade (1 unused, per person if disposable)
- Keratome blade (1 unused, per person if disposable)
- Sideport blade (1 unused, per person if disposable)
- Saline bag (1 per person)
- 18G needle (2 for AM session, 2 for PM session for injecting the vitreous if eyes are too soft)
- Viscoelastic (3 per person)
- 5cc syringe (1 per person)
- 1cc syringe (1 per person)
- trypan blue (1 per person)
- 22G anterior chamber cannula (2 per person)
- Cystotome (2 per person, may substitute a 27G needle if necessary)
- IOL (per person: 1 piece PMMA, 1 three-piece acrylic)
ANNEX W

Wet Lab Session Ten: Managing Complications 2: Vitreous Loss and Capsular Tears

Additional Supplies

- Practice eyes (2 per person; must be artificial eyes if practicing in the OR)
- Consumables for the vitrector (cassettes, vitrector tips, triamcinolone, egg whites)
- Basic saline solution bottle (1 per person)
- Crescent blade (1 unused, per person if disposable)
- Keratome blade (1 unused, per person if disposable)
- Sideport blade (1 unused, per person if disposable)
- Saline bag (1 per person)
- 18G needle (2 for AM session, 2 for PM session for injecting the vitreous if eyes are too soft)
- Viscoelastic (3 per person)
- 5cc syringe (1 per person)
- 1cc syringe (1 per person)
- trypan blue (1 per person)
- 22G anterior chamber cannula (2 per person)
- Cystotome (2 per person, may substitute a 27G needle if necessary)
- IOL (per person: 1 piece PMMA, 1 three-piece acrylic)
International Council of Ophthalmology (ICO) Ophthalmology Surgical Competency Assessment Rubric (OSCAR) and adapted Ophthalmology Surgical Simulation Competency Assessment Rubric (OSSCAR)

It is recommended to use the OSCAR or the adapted OSSCAR to assess the competency of each wet lab participant post course.


OSSCAR: http://simulatedocularsurgery.com/simulation/cataracts/
IOL Calculation Sheet


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**Preoperative Data:**

- **OD (right):**
  - AL: 22.84 mm (SD = 0.01 mm, SNR = 883.4)
  - K1: 43.21 D / 7.81 mm @ 169°
  - K2: 43.60 D / 7.74 mm @ 79°
  - SE: 43.41 D
  - Cyl.: 0.39 D @ 79°
  - R: 7.78 mm (SD = 0.00 mm)
  - Target Ref.: plano
  - Opt. ACD: 2.94 mm
  - Visual Acuity: Refraction: Eye Status: phakic

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<th>Li61se</th>
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**Preoperative Data:**

- **OS (left):**
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  - K1: 42.72 D / 7.90 mm @ 26°
  - K2: 43.60 D / 7.74 mm @ 116°
  - SE: 43.16 D
  - Cyl.: 0.88 D @ 116°
  - R: 7.82 mm (SD = 0.00 mm)
  - Target Ref.: plano
  - Opt. ACD: 3.43 mm
  - Visual Acuity: Refraction: Eye Status: phakic

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(* = Changed manually, ! = Borderline Value)

\[ 43.0 \text{D} \times 20^\circ \]
\[ 43.5 \text{D} \times 110^\circ \]
Orbis Simulation Course Objectives:
1. Ensure that learners are familiar with required surgical instruments, and their usage, pre-operatively.
2. Obtain the essential surgical skills of microsurgery to perform basic ophthalmology surgeries.
3. To assess the surgeon's competency to transition to perform the target procedure with live patients.
4. Reduce surgical complication rates, through repetitious skill building.

In this training, Phillips Eye models will be used.

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**ANNEX X**

Sample Wet Lab Training Schedule

**Orbis Wet Lab training in Ethiopia 2018**

**Orbis Simulation Course Objectives:**
1. Ensure that learners are familiar with required surgical instruments, and their usage, pre-operatively.
2. Obtain the essential surgical skills of microsurgery to perform basic ophthalmology surgeries.
3. To assess the surgeon's competency to transition to perform the target procedure with live patients.
4. Reduce surgical complication rates, through repetitious skill building.

In this training, Phillips Eye models will be used.

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**Week 1: Glaucoma**

**Specific objectives**
1. Describe all required surgical instruments and their usage.
2. Describe the basic steps of trabeculectomy.
3. Describe the anatomical relationships of the surgical limbus of the eye.
4. Independently perform different configurations (including square, rectangular, trapezoidal, and triangular) of the scleral flap.
5. Independently perform a sclerostomy with the appropriate tissue treatment.
6. Independently perform suture techniques for closing the scleral flap and the conjunctiva.

**Four (4) stations**

In each station, there will be a microscope and the surgical instruments necessary to practice the above objectives. The Phillips Studio eye model will be used in its basic and advanced version.

Each station will accommodate two (2) residents. There will be two daily sessions of three hours of practice for four days. The first two days will utilize the basic eye models to complete the objectives 1 through 5, and the last two days will utilize advanced eye models in order to reach objective 6.

The wet lab sessions will be preceded by a lecture on surgical technique. At the end of the day, there will be a debriefing meeting to discuss advances and challenges.
**ANNEX X**

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**Week 2: Strabismus**

*Specific objectives*
1. Identify anatomy associated with rectus muscle recession and resection.
2. Identify and describe the usage of instruments used in strabismus surgery.
3. Identify and choose the correct needle type and suture type for strabismus surgery.
4. Describe and independently perform the steps of a rectus muscle recession and resection.
5. Attempt, under supervision of instructor, a safe scleral pass on an artificial eye and know the points of high risk.
6. Demonstrate with instructor the technique of reattachment of EOM.
7. Demonstrate the adequate management of the conjunctiva in this surgery.

*Four (4) stations*
In each station, there will be a microscope and the surgical instruments necessary to practice the above objectives. The Phillips Studio eye model will be used in its basic and advanced version.

Each station will accommodate two (2) residents. There will be two daily sessions of three hours of practice for four days. The first two days will utilize the basic eye models to complete the objectives 1 through 6, and the last two days will utilize advanced eye models in order to reach objective 7.

The wet lab sessions will be preceded by a lecture on surgical technique, and at the end of the day there will be a debriefing meeting to discuss advances and challenges.

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**Week 3: Cataract**

*Specific objectives*
1. Describe all required surgical instruments and their usage.
2. Independently perform scleral-corneal tunnel.
3. Independently perform CCC.
4. Independently perform hydrodissection and luxation of the nucleus.
5. Independently to extract the nucleus.
6. Independently insert an IOL into the bag.

*Four (4) stations*
In each station, there will be a microscope and the surgical instruments necessary to practice the above objectives. The Phillips Studio MICS eye model will be used in these sessions.

Each station will accommodate two (2) residents. There will be two daily sessions of three hours of practice for four days. It is expected that in the first two days, the trainees will successfully complete objectives 1 through 3, and the remaining two days will be utilized to complete objectives 4 through 6.

The wet lab sessions will be preceded by a lecture on surgical technique, and at the end of the day there will be a debriefing meeting to discuss advances and challenges.
Our Vision

To transform lives through the prevention and treatment of blindness.

Our Mission

With our network of partners, we mentor, train and inspire local teams so they can save sight in their communities.

Our Values

Caring, Accountability, Trust, Commitment and Excellence