Orbis International would like to acknowledge:

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John D. Ferris, FRCOphth, Royal College of Ophthalmologists
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William Dean, FRCOphth, MEd, MBChB, BSc, London School of
Hygiene & Tropical Medicine

Carrie Muntz, RN

Yared Assefa, MD, University of Gondar, for their inputs into this manual.

Orbis International also acknowledges the leadership of
Dr. Rishi Raj Borah, Country Director, Orbis India and our Orbis India
colleagues in bringing this Simulation Center Manual to fruition.
One of the most critical deficits in global eye health is the lack of an adequately trained workforce. This is the very reason Orbis was founded – to provide ongoing training and support to eye care teams around the world.

For nearly four decades, at every step of the journey, Orbis has harnessed the power of technology and innovation to take our efforts to end avoidable blindness to an unprecedented scale around the globe.

Orbis invented its Flying Eye Hospital – a state-of-the-art teaching facility complete with an operating room, classroom and recovery room – to reach remote communities before the Internet was born. Eye care professionals who step foot on our current plane – the third-generation Flying Eye Hospital – reap the benefits of bold enhancements we’ve made to our technology over the years, including an advanced audio-visual system that allows local eye care teams in the plane’s classroom to watch surgeries happening in the operating room live in 3D.

Orbis’s telemedicine platform, Cybersight, uses internet and mobile technologies to reach eye care teams worldwide, including in remote and conflict-affected areas, with training. Training activities, including live lectures and surgeries, on board the Flying Eye Hospital are broadcast via Cybersight to partner hospitals and classrooms around the globe. A new artificial intelligence (AI) tool on Cybersight examines digital photographs to identify common eye diseases in a mere eight seconds, allowing more doctors in low-resource countries to provide early detection for their patients.

The latest in the line of Orbis’s innovations is our simulation training programs and centers that use cutting-edge technology – like virtual reality, artificial eyes, and life-like manikins – to safely build local eye care teams’ skills in controlled environments, without patient risk.

Aviation and aerospace industries have been using simulation as a teaching tool for many years. Simulators are now widely used in education and training to foster a culture of safety in a variety of professions, including healthcare.

For the past five years, Orbis has adopted and adapted best practices in simulation from other industries and medical disciplines to create a state-of-the-art simulation center on board the Flying Eye Hospital. Orbis has also provided infrastructure, faculty development, curricula design and coaching to support global partners as they develop and integrate structured simulation training courses into their teaching institutions and programs.

This manual represents the culmination of Orbis’s experience delivering simulation training to thousands of eye care professionals, across several continents. The manual serves as a practical implementation guide for training hospitals and teaching institutions on establishing a simulation center, designing simulation training and ensuring ongoing management of the program. The manual provides ophthalmic departments with the resources they need to implement high-quality simulation training for ophthalmologists, ophthalmologists-in-training, ophthalmic nurses and anesthesiologists.

As the world faces a projected tripling of blindness by the year 2050, the need is urgent to ensure that eye care professionals everywhere can reap the benefits of the latest innovations in training – because when eye care teams get the quality training they need, patients get the quality care they deserve.

Dr. Danny Haddad
Chief of Program
Orbis International
## List of Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALS</td>
<td>Advanced Life Support</td>
</tr>
<tr>
<td>BLS</td>
<td>Basic Life Support</td>
</tr>
<tr>
<td>BSS</td>
<td>Balance Salt Solution</td>
</tr>
<tr>
<td>CCC</td>
<td>Continuous Curvilinear Capsulorhexis</td>
</tr>
<tr>
<td>CPR</td>
<td>Cardiopulmonary Resuscitation</td>
</tr>
<tr>
<td>IAPB</td>
<td>International Agency for the Prevention of Blindness</td>
</tr>
<tr>
<td>ICO</td>
<td>International Council of Ophthalmology</td>
</tr>
<tr>
<td>IOL</td>
<td>Intraocular Lens</td>
</tr>
<tr>
<td>LAST</td>
<td>Local Anesthetic Systemic Toxicity</td>
</tr>
<tr>
<td>LMA</td>
<td>Laryngeal Mask Airway</td>
</tr>
<tr>
<td>LMIC</td>
<td>Low- and Middle-Income Countries</td>
</tr>
<tr>
<td>MSICS</td>
<td>Manual Small Incision Cataract Surgery</td>
</tr>
<tr>
<td>O2</td>
<td>Oxygen</td>
</tr>
<tr>
<td>OR</td>
<td>Operating Room</td>
</tr>
<tr>
<td>OSCAR</td>
<td>Ophthalmology Surgical Competency Assessment Rubric</td>
</tr>
<tr>
<td>OSSCAR</td>
<td>Ophthalmology Simulation Surgical Competency Assessment Rubric</td>
</tr>
<tr>
<td>PEARLS</td>
<td>Promoting Excellence and Reflective Learning in Simulation</td>
</tr>
<tr>
<td>SS</td>
<td>Surgical Safety</td>
</tr>
<tr>
<td>TASS</td>
<td>Toxic Anterior Segment Syndrome</td>
</tr>
<tr>
<td>URI</td>
<td>Upper Respiratory Infection</td>
</tr>
<tr>
<td>VR</td>
<td>Virtual Reality</td>
</tr>
<tr>
<td>VRE</td>
<td>Virtual Reality Excursion</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
</tbody>
</table>
# Table of Contents

**Background** ........................................................................................................................................... 5

**The Solution: Using Simulation** ................................................................................................................. 6
- What Is A Simulation Center? .................................................................................................................. 8
- Simulation Centers: The Orbis Way ......................................................................................................... 9

**Simulation Training In Ophthalmology** ..................................................................................................... 10
- Simulation Center Equipment ................................................................................................................ 11
- Simulation Center Virtual, Artificial And Biologic Eyes ........................................................................ 14
- Simulation Center Instruments And Consumables .................................................................................. 17
- Simulation Modules And Learning Objectives ....................................................................................... 19
- Simulation Training Participant Assessment .......................................................................................... 23

**Simulation Training In Nursing** ............................................................................................................. 25
- Simulation Center Equipment ................................................................................................................ 26
- Simulation Center Supplies And Consumables ...................................................................................... 28
- Simulation Modules And Learning Objectives ....................................................................................... 30
- Simulation Training Participant Assessment .......................................................................................... 35

**Simulation Training In Anesthesia** .......................................................................................................... 36
- Simulation Center Equipment ................................................................................................................ 37
- Simulation Center Supplies And Consumables ...................................................................................... 40
- Simulation Modules And Learning Objectives ....................................................................................... 42
- Simulation Training Participant Assessment .......................................................................................... 46

**Simulation Training Debriefing** .............................................................................................................. 47

**Running A Simulation Center** .................................................................................................................. 48
- Human Resources .................................................................................................................................. 49
- Structured Program ................................................................................................................................. 50
- Blended-Learning .................................................................................................................................... 51

**Simulation Training Resources** .............................................................................................................. 52

**Appendix 1. Simulation Center Equipment Resources (URLs)** .............................................................. 53

**References** ................................................................................................................................................ 56
Background

Insufficient human resources in eye care delivery is a global problem.

At present, there are not enough ophthalmologists capable of performing high-quality surgery to meet the growing demand for eye health. The burden of eye disease is unfairly borne by populations of low and middle-income countries (LMICs), where the lack of trained ophthalmologists is most acute. Among existing ophthalmologists in low-resource settings, many do not operate at all, or have low surgical output. Additionally, visual outcomes of surgery in many LMICs fail to meet the World Health Organization’s (WHO) recommended standards.

This lack of ophthalmologists is not limited to LMICs. While a third of ophthalmologists worldwide practice in the USA, Russia, and China, and there is a global rise in the total number of ophthalmologists, the growing and aging population in many high-income countries is increasing faster than the number of ophthalmologists. These aging populations will put pressure on current ophthalmic service providers globally, requiring aggressive programs able to train enough doctors to meet the rising demand for eye care services in the coming years.

Beyond skilled ophthalmologists, there is a global shortage of qualified and trained nurses. Nurses provide critical care, including service delivery, counseling, and health promotion. Further, nurses deliver pre- and post-operative patient care, circulate and scrub in the operating room, and manage instrument care and sterilization, all of which are critical to the delivery of quality patient care and safe surgical practices.

Additionally, the World Federation of Societies of Anesthesiologists reported that a “high number of countries reported a total anesthesia provider number of less than 5 per 100,000 population, highlighting the current crisis in the surgical and anesthesia workforce.” Anesthesiologists capable of providing high quality general and local anesthesia for both adult and pediatric patients, as well as managing critical events in the operating room, are essential for safe surgical practices and patient care.

Training is key to establishing a strong workforce in eye health. Eyes are small and require specific training and experience to know how to deal with complications – and according to Courtright et al. “considerable practice is needed to master the examination techniques.” Training is vital to increase not only the number of, but the abilities of staff dedicated to eye health.

While training is crucial to meeting the growing need for surgical services in eye care, in many settings, the majority of ophthalmic residents are not receiving adequate hands-on surgical training to ensure surgical competency, with some receiving none at all. Shortfalls in training are mirrored in nursing and anesthesia disciplines. In this context the need to provide high quality practical education for surgical and clinical skills is critical.
The Solution: Using Simulation

For the purpose of this manual, simulation is defined as “recreating or imitating part of some clinical scenario for the purpose of training or evaluation.” Simulation training is a well-recognized modality that augments traditional education in many professional fields, including aviation, the military, and law enforcement. Today, we find simulation education being used as a common teaching method and found in many current ophthalmic and anesthesia residency programs, as well as nurse training programs. The past few decades have seen an enormous growth of this tool as part of medical education.

Simulation allows training in:

- New techniques and competencies, particularly in complex or rare cases
- Refreshing existing skills
- Management of complications; crises and adverse events
- Improving patient safety, by using simulated eyes to improve the learning curve prior to operating on live patients.
In ophthalmology, using a simulated environment for surgical skills building and perfection, on biologic or simulated model eyes or manikins, reduces the learning curve for difficult techniques and accelerates surgical and clinical competency achievement rates for trainees.

An ophthalmologist experiences the highest complication rates during their first 60 – 80 surgical cases.\textsuperscript{14,15,16} Evidence demonstrates that structured surgical simulation courses can reduce the complication rates in these initial operations\textsuperscript{15} and the learning curve of difficult surgical techniques, accelerate the rate for trainees to achieve surgical competency, and improves patient safety.\textsuperscript{17} A Royal College of Ophthalmologists’ National Ophthalmology database study of nearly 18,000 cases performed by first- and second-year residents showed a 38\% reduction in posterior capsule rupture rates for residents who’d undergone simulation training compared to trainees who did not receive this form of simulation training. This is estimated to prevent 450 to 500 cases of complicated surgery in the United Kingdom during the course of every year, enough to save the NHS almost a million pounds, which would easily pay for all the simulation programs in the entire United Kingdom.\textsuperscript{18} The Institute of Medicine reported that “health care organizations and teaching institutes should participate in the development and use of simulation for training novice practitioners, problem solving and crisis management.”\textsuperscript{19} Evidence shows that the use of simulation training in nursing can contribute to patient safety and optimal outcomes for patient care by allowing nurses to experience scenarios and intervene in clinical situations in a safe, supervised environment which does not pose any risks to patients.\textsuperscript{20}

Anesthesia is at the forefront of simulation training in medicine, and today, simulation is an integral part of training anesthesia residents. In turn, this training has demonstrated improved skills-sets of anesthesiologists.\textsuperscript{21} Jones et al.’s research demonstrated “a significant relationship between simulation training and critical incident occurrence, with a critical incident more likely to occur during patient anesthesia for students who did not experience pre-clinical anesthesia simulation training.”\textsuperscript{22}

The enormous growth in the number of simulation centers and the wealth of peer reviewed papers shows that simulation really has become key to high quality ophthalmic, nursing, and anesthesia training.

\textbf{Evidence demonstrates that structured surgical simulation courses can reduce the complication rates in these initial operations and the learning curve of difficult surgical techniques, accelerate the rate for trainees to achieve surgical competency, and improve patient safety.}
What is a Simulation Center?

A simulation center is an internationally accepted resource for medical education and is essential to training the next generation of eye health professionals. It's normally located within a teaching hospital and can use any combination of virtual reality, biologic, or artificial eye models, high-fidelity manikins and trainers, or scenario-based simulation learning. At Orbis, we employ simulation centers to provide practical education in surgical and clinical skills for ophthalmologists, ophthalmologists-in training, anesthesiologists, and ophthalmic nurses.

Further, we emphasize the benefits of the safety, communication, and avoidance of distraction standards of the aviation industry. Aviation, a pioneer of simulation training, is at the forefront of using simulation training to ensure optimal outcomes and personnel and customer safety. The resources developed by the aviation industry, such as their safety protocols and standardized checklists, serve as valuable education tools in medical simulation training.

A simulation center should include:

- Appropriate equipment to allow for training of all eye health workers identified
- Required supplies and consumables
- Structured curricula, which specify learning objectives, methods used, and theory employed
- Assessment tools to monitor progress and confirm competency of learners
- Debriefing tools that allow for feedback and development
- If possible, access to internet-based resources to foster and support the simulation training.

The Simulation Center Manual will cover each of these points for the main areas of medical education employed by Orbis:
Simulation Centers: The Orbis Way

**Traditional Simulation Centers**

Orbis helps partners create simulation centers at their training hospitals. We advise and help procure equipment, instruments, and consumables that learners can use to practice in a simulated environment to prepare them to perform surgery or provide clinical care. The equipment and supplies identified mimic, as much as possible, what a learner is likely to use in their operating suite in order for them to become familiar with the operating room environment.

In addition to the physical infrastructure, Orbis supports the development of a simulation curriculum with pre-determined learning objectives. The curriculum also includes assessment materials and supplemental content, such as Orbis Cybersight – Orbis’s telemedicine and online learning platform. This model is referred to as “Simulation Plus” by the International Agency for the Prevention of Blindness (IAPB).23

**Remote Simulation Centers**

As part of our efforts to enhance our education and training initiatives through technology, and improve residency programs in low resource settings, Orbis has developed an innovative digital simulation training model. By pairing residents weekly with an international expert volunteer via real-time video conference, residents have access to a world class professor without having to leave their clinics. Weekly lectures are coupled with wet lab assignments on a specific step or steps in the surgical procedure. These assignments are video recorded and uploaded to Cybersight for grading and feedback by the remote professor. This feedback is critical, as it monitors the progress of the resident’s skill development and ensures that they don’t learn incorrect techniques, such as poor instrument manipulation and hold.

This remote simulation training approach has demonstrated improvement in the quality of residents’ surgeries. It also provides simulation training for residents where faculty staff have limited time due to staff shortages.

*You can find a guide for implementation of an Orbis MSICS remote simulation course in Annex A of the Simulation Center Manual Annexes.*

**Integrated with Virtual Reality Simulation**

Simulation training using virtual reality (VR), most prominently the Eyesi® Surgical Simulator from VRMagic, has demonstrated great success at improving residents’ surgical skills and speed. Where resources allow, integrating VR training is recommended. However, the high cost puts VR out of reach for many teaching hospitals. As such, Orbis is also exploring the possibility of teaming with industry leaders to create a software solution which utilizes the confluence of affordable technologies to make this more accessible globally.
Simulation Training in Ophthalmology
Simulation training for key clinical and surgical skills increases the confidence of ophthalmologists and ophthalmologists-in-training, while reducing early surgery complication rates. In this section, we'll provide resources to guide developing both the physical infrastructure of a simulation center for ophthalmology (furnishings, equipment, and supplies), as well as the learning resources required (structured curricula, assessment, and debriefing tools).

**Simulation Center Equipment**

It is important to note that simulation can range in sophistication and costs. However, at its most basic, simulation training can be done on affordable items such as fruit and latex gloves, using low-cost microscopes. It’s good to be aware of the range of potential items, in order to make a simulation center that meets the budget and resource availability of your program. An excellent resource is the “IAPB Essential List for Simulation-Based Learning (Cataract Surgery).” 

Further, as with any other equipment you buy, please use best practices when purchasing equipment for your simulation center, including:

- ensuring that you purchase equipment with a warranty (recommended 3-year warranty).
- purchasing a model that has manufacture support available in your location.
- verifying that your purchase comes with installation and, preferably, a user manual.
- considering, once the warranty expires, purchasing maintenance with the vendor.
- making sure that relevant staff (end users, technicians and biomedical engineers) receive training on preventative care from the manufacturer at the time of installation.

Please refer to Appendix 1: *Simulation Center Equipment Resources* for product websites.
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Spacious room with good lighting</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Small fridge</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Table/desk or workbench for simulation stations</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>Storage for instruments and supplies</td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td>Surge protection as needed</td>
<td>10</td>
</tr>
</tbody>
</table>
**Surgical Microscopes**

The most important piece of equipment for simulation is the microscope. If possible, we recommend a low-cost surgical microscope that mimics what a surgeon will find in the theater, i.e., foot pedals. Further, a microscope with video recording capabilities and monitor allows for enhanced training through surgical simulation video review and remote simulation training activities.

The following table provides options for microscopes:

<table>
<thead>
<tr>
<th>Cost</th>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Cost</td>
<td>Model D Stereo Microscope</td>
<td>These microscopes are under $300 USD. While you will not get the same magnification as a wet lab microscope, many basic steps of anterior segment surgery can be practiced, especially when paired with a magnifying glass.</td>
</tr>
<tr>
<td>Low- to Mid-Range Desktop</td>
<td>ZEISS Stemi 305 EDU</td>
<td>These microscopes range between $1,500 and $5,000 USD depending on the selected model. Limitations are the short distance from binoculars, lack of red reflex, and bench models without foot pedals and other key features of an operating microscope.</td>
</tr>
<tr>
<td>Mid-Range</td>
<td>INAMI – L094OSD</td>
<td>This low-cost portable surgical microscope costs about $7,000 USD.</td>
</tr>
<tr>
<td>High-End</td>
<td>Zeiss OPMI Lumera 300</td>
<td>With recording capabilities, a teaching scope, and monitor, this surgical microscope costs about $45,000 USD and allows for a fully realistic surgical simulation.</td>
</tr>
</tbody>
</table>

**Phacoemulsification Machine**

In order to teach phacoemulsification, cataract complication management, and some advanced anterior segment procedures, your simulation center will require a phacoemulsification machine. There are many models on the market; here are two recommended by Orbis and the IAPB:

1. APPASAMY Phacoemulsification with Victrectomy System
2. Alcon Laureate

**Additional Equipment**

The following is also required:

- Instrument tray/trolley for workstations
- Kidney bowls
- Stand for fluids
To simulate ophthalmic surgery, you need a simulated eye, and just like with equipment, there are a number of options that range in cost.

**Virtual Reality**

Virtual reality (VR) for training medical professionals is growing rapidly. Many fields of medicine are using VR to improve surgical competency and ophthalmology is no exception. There are a few surgical simulators on the market and a few in development, but currently, VRMagic produces simulators which have the most research documented on their effectiveness in training ophthalmic residents. If budget allows, we recommend the following for a state-of-the-art simulation center.

---

**Eyesi® Surgical Simulator:** A high-end virtual reality simulator for intraocular surgery training. The Eyesi® platform can be equipped with interfaces for vitreoretinal and cataract surgery. Software modules provide the actual training content. Available modules include basic skills training, training of surgical procedures, and complications management.  

**Eyesi® Indirect Ophthalmoscope:** A high-end augmented reality simulator for training in retinal examinations. As opposed to studying two-dimensional images, Eyesi® Indirect provides a highly realistic and dynamic 3D simulation of the anatomical structures of the eye and ophthalmoscope optics.

---

**The Eyesi® Surgical Simulator**

**The Eyesi® Indirect Ophthalmoscope**
**Artificial Eyes**

There are a number of models on the market. At Orbis, we field-tested several models and created the below product guide. However, we do recommend that you test a few models to see what fits best with your style of teaching and simulation centers. Product costs are fairly comparable.

*For Orbis’s evaluation notes on different models, please see Annex B of the Simulation Center Manual Annexes.*

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Artificial Eyes Preferred Providers</th>
<th>Eye Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incision</td>
<td>Phillips Eye (PS027)</td>
<td></td>
</tr>
<tr>
<td>Phaco (Rhexis)</td>
<td>Kitaro (CCC)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Phillips Eye (PS025)</td>
<td></td>
</tr>
<tr>
<td>Phaco (Complete Surgery)</td>
<td>Phillips Eye (Preferred PS025. PS012 and PS013 can be used as well)</td>
<td></td>
</tr>
<tr>
<td>MSICS</td>
<td>Phillips Eye (PS027)</td>
<td></td>
</tr>
<tr>
<td>Iris (suturing, Malyugin ring,</td>
<td>Phillips Eye (PS031)</td>
<td></td>
</tr>
<tr>
<td>iris-sutured IOLs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complex Cataract Cases</td>
<td>Phillips Eye (PS025): can be used for miLOOP, MST retractors or anterior vitreous procedures.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Phillips Eye (PS029): can be used for glued IOLs and the Yamane technique.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Simuleye (iris suturing + IOL fixation): can be used for the Yamane technique.</td>
<td></td>
</tr>
</tbody>
</table>
### Valve
- Philips Eye (PS-017A-TB)

### Trabeculectomy
- Phillips Eye (PS022 – Basic or PS023 – advanced)

### MIGS
- Simuleye (for KDB)

### Strabismus
- Phillips Eye (PS -17A)
- Bioniko (for pterygium only)

### Indirect Ophthalmoscopy
- Bioniko (Posterior Model)

---

**Biologic Eyes**

As a low-cost alternative, animal eyes or fruit substitutes are also commonly used for simulating cataract surgery, suturing, and other key ophthalmic skills. The most common animal eye used is pig, which best mimics the human eye. Common fruit used are blueberries, grapes, and tomatoes. Another recommendation is to use the microwave to briefly heat the animal eye, thus causing a cataract, for a more realistic simulation.
Simulation Center Instruments and Consumables

In this section, we provide recommendations for standard instrument and consumables kits for different simulated surgery modules, using model or biologic eyes.

**Phacoemulsification Simulation**

<table>
<thead>
<tr>
<th>Instrument Tray Kit</th>
<th>Consumables</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Needle holder</td>
<td>1. Saline solution for phacoemulsification machine</td>
</tr>
<tr>
<td>2. 0.12 forceps</td>
<td>2. Viscoelastic</td>
</tr>
<tr>
<td>3. Snellen loop</td>
<td>3. IOL</td>
</tr>
<tr>
<td>5. Ultrata</td>
<td>5. Nylon 10-O</td>
</tr>
<tr>
<td>7. Vannas scissors</td>
<td></td>
</tr>
<tr>
<td>8. Lens dialer</td>
<td></td>
</tr>
<tr>
<td>9. Phaco handpiece, Monarch</td>
<td></td>
</tr>
</tbody>
</table>

**Manual Small Incision Cataract Simulation**

<table>
<thead>
<tr>
<th>Instrument Tray Kit</th>
<th>Consumables</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Wescott scissors</td>
<td>1. Viscoelastic</td>
</tr>
<tr>
<td>2. 0.12 forceps</td>
<td>2. IOL</td>
</tr>
<tr>
<td>5. McPherson’s forceps</td>
<td>5. 15° blade</td>
</tr>
<tr>
<td>7. Chopper</td>
<td></td>
</tr>
<tr>
<td>8. Vannas scissors</td>
<td></td>
</tr>
<tr>
<td>9. Lens dialer</td>
<td></td>
</tr>
<tr>
<td>10. Spatula</td>
<td></td>
</tr>
</tbody>
</table>
**Glaucoma Simulation**

**Instrument Tray Kit**
1. Needle holder
2. 0.12 forceps
3. Wescott scissors
4. Caliper
5. Kelly punch
6. Vannas scissors
7. Toothed forceps

**Consumables**
1. Viscoelastic
2. IOL
3. Nylon 10-0
4. Marker
5. 15° blade
6. Crescent blade

---

**Strabismus Simulation**

**Instrument Tray Kit**
1. Needle holder
2. 0.12 forceps
3. Wescott scissors
4. Jameson hook
5. Green hook
6. McPherson's forceps
7. Caliper

**Consumables**
1. Marker
2. Vicryl 6-0

---

**Suturing/Pterygium**

**Instrument Tray Kit**
1. Needle holder
2. 0.12 forceps
3. Wescott scissors
4. Jameson hook
5. Green hook
6. McPherson's forceps
7. Caliper

**Consumables**
1. Vicryl 6-0
2. Nylon 10-0
Simulation Modules and Learning Objectives

At Orbis International, we have identified the following learning objectives for simulation modules for medical and surgical retina, cataract (including phacoemulsification and MSICS), glaucoma, strabismus, and pterygium.

**Key objectives for any simulation:**

1. Ensure that learners are familiar with required surgical instruments, and their usage, pre-operatively.
2. Assess the surgeon’s competency to transition to perform the target procedure with live patients.
3. Reduce surgical complication rates through repetitious skill-building.

**Module Learning Objectives:**

**Module One: Phacoemulsification with model or biologic eyes**

1. Describe all required surgical instruments and their usage.
2. Independently perform self-sealing corneal wounds.
3. Independently perform continuous curvilinear capsulorhexis (CCC).
4. Independently perform hydrodissection.
5. Independently create a groove.
6. Independently extract the nucleus using phacoemulsification.
7. Independently insert an IOL into the bag.

**Module Two: MSICS with model or biologic eyes**

1. Describe all required surgical instruments and their usage.
2. Independently perform scleral-corneal tunnel.
3. Independently perform capsulorhexis (CCC or other).
4. Independently perform hydrodissection and luxation of the nucleus.
5. Independently extract the nucleus.
6. Independently insert an IOL into the bag.

**Module Three: Phacoemulsification with virtual reality Eyesi® surgical trainer**

**Basic Course**

1. Demonstrate effective forceps techniques for optimal tissue manipulation during CCC.
2. Describe the appropriate vector forces for the CCC.
3. Demonstrate correct bimanual movements for phacoemulsification chopping.
4. Demonstrate the ability to optimize the fluidics of the phacoemulsification probe during each step of cataract surgery.
5. Demonstrate safe aspiration of cortex during irrigation and aspiration.
6. Demonstrate safe use of ultrasound and aspiration during quadrant removal.
7. Demonstrate efficient sculpting for divide and conquer technique.
8. Demonstrate efficient nucleus cracking.
9. Demonstrate correct insertion of a spherical IOL.
Specific Objectives: Reliability gate (3)* and minimal required score (60)

1. Independently perform a CCC with Utrata forceps.
2. Independently perform hydrodissection and hydrodelineation.
3. Independently perform a groove (“Stop and Chop”) and two grooves (“Divide and Conquer”).
4. Independently perform nucleus extraction with phacoemulsification (with preset settings of the phacoemulsification machine).
5. Independently insert the IOL in the bag.

Advance Course

1. Demonstrate effective use of cystotome and forceps flap construction in normal and complex conditions, such as increasing capsule tensions, weak zonules, and complications.
2. Demonstrate proper use of viscoelastic fluid to preserve chamber depth and flap stability during the CCC.
3. Demonstrate CCC technique on high tension capsule.
4. Demonstrate hydrossection technique for dense nucleus.
5. Complete irrigation and aspiration step using straight or bent tip for either coaxial or bimanual irrigation and aspiration.
7. Perform “Stop and Chop” technique.
8. Demonstrate correct insertion of a Toric IOL.

Specific Objectives: Reliability gate (3)* and minimal required score (60)

1. Independently perform a CCC with Utrata forceps under the following conditions:
   a. Errant tear
   b. Weak zonules and capsule
   c. White cataract
   d. Capsular plaques
2. Independently perform hydrodissection and hydrodelineation in complex cases.
3. Independently perform a groove (“Stop and Chop”) and two grooves (“Divide and Conquer”).
4. Independently perform nucleus extraction with phacoemulsification using phacodynamic concepts.
5. Independently insert the IOL in the bag using Malyugin ring.
6. Independently perform an anterior vitrectomy.

Module Four: Trabeculectomy with model or biologic eyes

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.

* Reliability gate refers to the number of sequential times the task must be successfully completed to be considered competent.
Module Five: Medical Retina with model eyes

1. Identify retinal anatomy.
2. Recognize the inverted image of the fundus.
4. Describe the characteristics of the laser equipment.
5. Independently manage the laser settings according to the desired treatment.

Module Six: Indirect Ophthalmoscopy with Eyesi® Indirect Ophthalmoscope virtual reality simulator

1. Identify the components of the indirect ophthalmoscope and related lenses.
2. Independently perform an adequate retinal examination, including 360 degrees of the retinal periphery.
3. Describe the anatomical findings and identify the most common pathological lesions.

Specific Objectives: Reliability gate (2) and minimum required score (90)

1. Perform navigation.
2. Perform examination of the healthy retina.
3. Perform examination of the diabetic retinopathy patient.
4. Perform examination of the glaucoma patient.

Module Seven: Suturing/strabismus station with model eyes

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 list the points of high risk.
6. Demonstrate with instructor the technique of reattachment of extraocular muscle.

Module Eight: Pterygium with model eyes

1. Identify and describe the instruments needed to perform suture (forceps 0.12, McPherson’s straight/curved forceps, suture of the specific type for the fabric, grip holder, and Wescott scissors).
2. Independently performs the following:
   a. Take the needle with the needle holder at 1/3 of the distal edge at a 90-degree angle
   b. Pass the needle through the edge of the tissue in a symmetric matter and at a X distance from the initial indicated edge (conjunctiva, tenon, corneal stroma, muscle, etc.)
   c. Pass the suture so that the necessary amount of thread is secured for the required stitch
   d. Perform the stitch required using a straight McPherson and 0.12 forceps, making 3 knots following the suture level and tissue
   e. Cut the suture using Wescott scissors at the required distance
   f. Perform symmetric, radial sutures with the required tension in the required amount of time
Module Nine: Anterior vitrectomy with model eyes

1. Describe all required surgical instrumentation and their usage.
2. Prepare the phacoemulsification equipment to perform an anterior vitrectomy.
3. Describe the different parameters such as vitrector cut rates, vacuum settings, flow rates, and irrigation/aspiration settings.
5. Independently inject Miochol®-E into the anterior chamber to identify the vitreous.
6. Independently perform an anterior vitrectomy to remove all of the vitreous from the anterior chamber and capsular bag, without damaging the anterior capsule or iris.
7. Independently implant a three-piece IOL into the ciliary sulcus through the corneal phacoemulsification incision.
8. Independently secure the corneal incision with a 10/0 nylon interrupted or a butterfly suture.

Module Ten: Vitreoretinal with Eyesi® surgical simulator

Basic Course

Specific Objectives: Reliability gate (3) and minimal required score (60)

1. Demonstrate proper set up of non-contact viewing system for optimal visualization and wide field view.
2. Demonstrate fluid use of microscope X/Y functions to center the surgical field in the field of view.
3. Demonstrate appropriate illumination for depth of field and visualization of tissue details.
4. Demonstrate spatial understanding of the vitreous space for safe instrument movements out to the equator and beyond.
5. Demonstrate tactical and discrete tilting of the eye with instrument pressure to view the periphery.
6. Demonstrate proper instrument handling with forceps and scissors.
7. Demonstrate dexterity of the non-dominant hand.

Intermediate Course

Specific Objectives: Reliability gate (3) and minimal required score (60)

1. Demonstrate proper settings for vitrectomy fluidics, for appropriate cutting rates, infusion, and aspiration levels.
2. Perform vitrectomy hand piece manipulation for effective tissue cutting and aspiration.
3. Demonstrate use of scleral indentation for working in the periphery.
4. Perform laser probe manipulation for effective tissue adhesion with minimal burning of healthy retina and/or sensitive structures.
5. Demonstrate bimanual dexterity as needed in complex tasks.
6. Safely grasp and peel membranes with low to moderate adherence.
Simulation Training Participant Assessment

In order to get the full benefits of simulation and measure improvement in knowledge and skills, simulation centers must utilize a valid and reliable assessment tool. This assessment tool allows the measurement of the learner's progress towards the defined learning objectives/competencies of the simulation training delivered.

Ophthalmic Simulated Surgical Competency Assessment Rubric – Manual Small Incision Cataract Surgery (OSSCAR:MSICS)

<table>
<thead>
<tr>
<th>Score</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>Appropriate position of scleral fixation, but trauma.</td>
<td>Good position of fixation, no re-grip. Mild tissue trauma.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Scleral incision</td>
<td>Inappropriate position, shape and size; resistant 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>Inappropriate width, length and location. 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>Does not insert viscoelastic, or has difficulty accessing anterior chamber through paracentesis.</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 less capsule and endothelium.</td>
</tr>
<tr>
<td>5</td>
<td>Viscoelastic insertion</td>
<td>Inappropriate tunnel depth, resistant dissection. Button-hole and/or premature entry.</td>
<td>Able to dissect forward, and understands that tunnel depth is incorrect but unable to correct.</td>
<td>Tunnel constructed at correct plane.</td>
</tr>
<tr>
<td>6</td>
<td>Sclero-corneal tunnel</td>
<td>Does not extend into clear cornea. Button-hole and/or premature entry.</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. Significant loosening of anterior chamber. Requires wound extension or suturing.</td>
<td>Entry at mostly right plane. Able to extend but with repeated use of viscoelastic. Internal valve irregular. Requires wound extension or suturing.</td>
<td>Fluently enters right plane. Wound length adequate with no further need for extension.</td>
</tr>
<tr>
<td>8</td>
<td>Capsulotomy / Capsulorrhexis start</td>
<td>Tentative; size and position are inadequate for nuclear 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>10</td>
<td>Hydro-dissection: 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 hydrodissection 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. Hokes 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. Pinnacles 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

<table>
<thead>
<tr>
<th>Score</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>15</td>
<td>Wound neutrality and minimizing eye rolling and corneal distortion.</td>
<td>Nearly constant eye movement and corneal distortion.</td>
<td>Eye usually in primary position, mild corneal distortion folds occur.</td>
<td>The eye is kept in primary position during the surgery. No distortion folds are produced. The length and location of incisions prevent distortion of the cornea.</td>
</tr>
<tr>
<td>16</td>
<td>Eye position centrally within microscope view</td>
<td>Constantly requires repositioning.</td>
<td>Mild fluctuation in pupil position.</td>
<td>The pupil is kept centered during the surgery.</td>
</tr>
<tr>
<td>17</td>
<td>Scleral and corneal tissue handling</td>
<td>Tissue handling is rough and damage occurs.</td>
<td>Tissue handling decent but potential for damage exists.</td>
<td>Tissue is not damaged nor at risk by handling.</td>
</tr>
<tr>
<td>18</td>
<td>Intraocular spatial awareness</td>
<td>Instruments often in contact with capsule, iris, corneal endothelium; blunt second instrument not kept in appropriate position.</td>
<td>Rare contact with capsule, iris, endothelium. Often has blunt second hand instrument in appropriate position.</td>
<td>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</td>
<td>Hesitant, frequent starts and stops, not at all fluid.</td>
<td>Occasional inefficient and/or unnecessary manipulations occur.</td>
<td>Inefficient and/or unnecessary manipulations are avoided.</td>
</tr>
<tr>
<td>20</td>
<td>Overall speed of procedure</td>
<td>Case duration more than 30 minutes, or not completed.</td>
<td>Case duration 20-30 minutes.</td>
<td>Case duration less than 20 minutes.</td>
</tr>
</tbody>
</table>
The International Council of Ophthalmology’s Ophthalmology Surgical Competency Assessment Rubric (ICO-OSCAR) is globally recognized and currently considered to be the gold standard for objective assessment of surgical competency. As such, we recommend using a set of adapted ICO-OSCARS called Ophthalmology Simulated Surgery Competency Assessment Rubric (OSSCAR,) developed by Dr. William Dean. This abbreviated rubric, focuses on the key steps covered in simulation training. You can download all OSSCARs at Simulated Ocular Surgery.

If your center uses virtual reality training, you can also find evaluation forms for the basic and advanced cataract Eyesi® courses in Annexes C-D of the Simulation Center Manual Annexes.
Simulation Training in Nursing
Simulation training in nursing is a growing field, as the provision of safe patient care is at the forefront of the health care system. At Orbis, we focus on scenario-based simulation in ophthalmic nursing, creating the experience of various scenarios in pre- and post-operative care, sub-sterilization, scrub and circulating nursing, and basic life support (BLS). We also use specific task trainers for teaching key skills in the delivery of patient care.

In this section, we'll provide resources to support integrating simulation for ophthalmic nurses into the simulation center for ophthalmology. Once again, this will cover both the physical infrastructure as well as the learning resources required (assessment tools and structured curricula).

Simulation Center Equipment

As with ophthalmology, simulation can range in sophistication and costs. To see the range of simulation available, refer to Table 1, below:

<table>
<thead>
<tr>
<th>Type of Simulation</th>
<th>Description</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-tech (static) task trainers</td>
<td>Props, models, or manikins used to practice skills and procedures.</td>
<td>• No threat to patient safety</td>
<td>• Task training</td>
</tr>
<tr>
<td>e.g., food items: oranges for injections,</td>
<td></td>
<td>• Readily available</td>
<td>• Consistency</td>
</tr>
<tr>
<td>pigs' feet for suturing, injecta pads,</td>
<td></td>
<td>• Reusable</td>
<td>• Learner – memorization</td>
</tr>
<tr>
<td>adult/child/infant manikins, eye models,</td>
<td></td>
<td>• Develop role memorization</td>
<td>• Lower reliability</td>
</tr>
<tr>
<td>IV arms, CPR manikins, case studies</td>
<td></td>
<td>• Allows for demonstration of skills</td>
<td>• Limited critical thinking involved</td>
</tr>
<tr>
<td>Simulated patients</td>
<td>Role-play patients for training, simulates assessment of history taking,</td>
<td>• No threat to patient safety</td>
<td>• Variable amount of critical thinking</td>
</tr>
<tr>
<td>e.g., standardized patient (trained actors),</td>
<td>WHO safe surgical checklist, physical exams, communication, and therapeutic</td>
<td>• Great tool for developing communication skills</td>
<td>• Moderate cost.</td>
</tr>
<tr>
<td>learner/learner, patients playing role of</td>
<td>interventions.</td>
<td>• Provides relatively consistent experience for all students</td>
<td></td>
</tr>
<tr>
<td>patient, deliver case scenarios</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Screen-based computer simulators</td>
<td>Programs to train and assess clinical knowledge and decision-making.</td>
<td>• No threat to patient safety</td>
<td>• Variable amount of critical thinking</td>
</tr>
<tr>
<td>e.g., computer-assisted instruction (CAI),</td>
<td></td>
<td>• Provides relatively consistent experience for all students</td>
<td>• Moderate cost.</td>
</tr>
<tr>
<td>virtual reality excursions (VRE), web-based programs</td>
<td></td>
<td>• Reusable</td>
<td></td>
</tr>
<tr>
<td>Ophthalmic Equipment</td>
<td>While not specifically designed for training, you can use ophthalmic</td>
<td>• No threat to patient safety</td>
<td>• Variable amount of critical thinking</td>
</tr>
<tr>
<td></td>
<td>equipment to train nurses on equipment preparation and care. (Ex. Phaco</td>
<td>• Provides relatively consistent experience for all students</td>
<td>• Moderate cost.</td>
</tr>
<tr>
<td></td>
<td>machines, retina machines)</td>
<td>• Reusable</td>
<td></td>
</tr>
<tr>
<td>Human Patient Simulators</td>
<td>Full-length human manikins</td>
<td>• No threat to patient safety</td>
<td>• High cost (startup and ongoing cost)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• High degree of realism and authenticity.</td>
<td>• Maintenance</td>
</tr>
</tbody>
</table>

Table 1. Simulation center equipment range.20
For scenario-based simulation, we recommend using the equipment, supplies, and consumables that are present in the recovery, sub-sterile, and operating rooms of your hospital and/or teaching center. Creating and running nurses through scenarios in the actual service delivery environment creates a more realistic experience and supports decision-making and practices patterns that can easily be transferred to real life, with patients.

To support simulation training in cataract and surgical retina, we recommend the availability and use of a phacoemulsification machine and a vitrectomy machine. The model selected should align with what is used in the hospital operating suite; equipment should be functioning and available for training nurses.

Additionally, we recommend the following be in the simulation center:

- Projector or screen for the delivery of lectures, review of surgical videos, and other presentations
- Glucometer
- Crash cart, which includes a list of emergency items

Orbis also recommend a few task trainers to teach the following skills:

1. **Laerdal® Little Family CPR Manikins**: Used for effective delivery of CPR training. Oral and nasal passages allow realistic nose pinch required for mouth-to-nose ventilation and for the insertion of oral pharyngeal and nasal pharyngeal airways (OPA and NPA). Natural obstruction of the airway allows students to learn the important technique of opening the airway. Head tilt/chin lift and jaw thrust allow students to practice all maneuvers correctly when resuscitating a real patient.  

2. **Laerdal® Male Multi-Venous IV Training Arm**: Life-like adult arm reproductions with replaceable skin and veins designed for peripheral intravenous therapy.  

3. **Nasco Life/form® IV Puncture Arm (Pediatric)**: The arm is an exact reproduction of the arm of a six-year-old child. It is used to practice venipuncture and intramuscular injection techniques and procedures used in young children.  

4. **Laerdal® AED Trainers**: The Laerdal® AED Trainer 2 offers an affordable alternative for educating the layperson and healthcare provider in the effective use of an automatic external defibrillator.

Refer to Annex E of the Simulation Center Manual Annexes for a complete guide on nursing simulation station set-up.
Simulation Center Supplies and Consumables

While this will vary depending on learning objectives and scope of your simulation training, please find below a compiled list of key supplies and consumables. Those marked with an asterisk (*) are ideal but not essential.

<table>
<thead>
<tr>
<th>Supplies</th>
<th>Other Instruments or Supplies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Instrument Sets</strong></td>
<td></td>
</tr>
<tr>
<td>• Cataract</td>
<td>• Holding &amp; Folding Forceps</td>
</tr>
<tr>
<td>• Glaucoma</td>
<td>• Phaco Handpiece</td>
</tr>
<tr>
<td>• Retina</td>
<td>• I/A Handpiece</td>
</tr>
<tr>
<td>• Muscle</td>
<td>• IOL Introducer</td>
</tr>
<tr>
<td>• OCP</td>
<td>• Bimanual Irrigating Handpieces</td>
</tr>
<tr>
<td>• DCR</td>
<td>• Chopper</td>
</tr>
<tr>
<td>• Lacrimal Duct Probe Set</td>
<td>• Fragmatome Handpiece</td>
</tr>
<tr>
<td>• Cornea</td>
<td>• Landers Lenses</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Consumables</th>
<th>Phaco and Cornea</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic Items</strong></td>
<td></td>
</tr>
<tr>
<td>• Basic Pack</td>
<td>• Anterior Vicrectomy Set</td>
</tr>
<tr>
<td>• Gowns</td>
<td>• Phaco Tips/Sleeves</td>
</tr>
<tr>
<td>• Gloves</td>
<td>• IOL Cartridge</td>
</tr>
<tr>
<td>• 1061 Drape</td>
<td>• Phaco Packs (Depends on the brand of machine used)</td>
</tr>
<tr>
<td>• Gauze 4x4</td>
<td>• 27g Cannula</td>
</tr>
<tr>
<td>• Eye Pad</td>
<td>• Cystotome</td>
</tr>
<tr>
<td>• Needle Pad</td>
<td>• Hydrodissection Cannula</td>
</tr>
<tr>
<td>• Spears</td>
<td>• IOL</td>
</tr>
<tr>
<td>• Eye Shield</td>
<td>• 15 Deg. Knife</td>
</tr>
<tr>
<td>• Medication Labels</td>
<td>• 2.75mm Keratome</td>
</tr>
<tr>
<td>• Scrub Brushes</td>
<td>• Simcoe Cannula</td>
</tr>
<tr>
<td>• Q Tips</td>
<td>• AC Maintainer</td>
</tr>
<tr>
<td>• 3cc Syringe</td>
<td>• Trephines (donor &amp; recipient)*</td>
</tr>
<tr>
<td>• 10cc Syringe</td>
<td>• Instrument Wipe*</td>
</tr>
<tr>
<td>• Marking Pen</td>
<td>• Iris Retractors*</td>
</tr>
<tr>
<td></td>
<td>• Malyugin Ring*</td>
</tr>
<tr>
<td></td>
<td>• Capsular Tension Ring*</td>
</tr>
<tr>
<td></td>
<td>• 2.2mm Keratome*</td>
</tr>
<tr>
<td></td>
<td>• 2.4mm Keratome*</td>
</tr>
</tbody>
</table>
### Consumables

<table>
<thead>
<tr>
<th>Virectomy &amp; Retina</th>
<th>Glaucoma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Filter x2</td>
<td>Crescent Knife</td>
</tr>
<tr>
<td>Disp. Charles Flute</td>
<td>Kelly Punch</td>
</tr>
<tr>
<td>Vitrectomy Pack (Depends on the brand of machine used)</td>
<td>Trabeculotomes*</td>
</tr>
<tr>
<td>Silicone Oil Pack</td>
<td></td>
</tr>
<tr>
<td>Fragmatome Access Pack</td>
<td></td>
</tr>
<tr>
<td>Soft Tip Cannula</td>
<td></td>
</tr>
<tr>
<td>25g Bore Cannula</td>
<td></td>
</tr>
<tr>
<td>Scleral Buckle/Sponge*</td>
<td></td>
</tr>
<tr>
<td>Steristrips 1/2 inch*</td>
<td></td>
</tr>
<tr>
<td>Disp. Micro Forceps ILM*</td>
<td></td>
</tr>
<tr>
<td>Disp. Micro Forceps Endgrasping*</td>
<td></td>
</tr>
<tr>
<td>Disp. Micro Scissors*</td>
<td></td>
</tr>
<tr>
<td>Auto Gas Fill Pack*</td>
<td></td>
</tr>
</tbody>
</table>

### OCP

<table>
<thead>
<tr>
<th>Sutures</th>
<th>Meds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monopolar Tip</td>
<td>BSS 500ml (an alternative to BSS is sodium chloride 0.9% or Ringer’s lactate solution)</td>
</tr>
<tr>
<td>No. 15 Beaver Blade</td>
<td>Viscoelastic (or a substitute)</td>
</tr>
<tr>
<td>No. 11 Beaver Blade</td>
<td>Betadine 5%</td>
</tr>
<tr>
<td>Ribbon Gauze x2*</td>
<td>BSS 15ml*</td>
</tr>
<tr>
<td>Gelfoam*</td>
<td>Sterile water 250ml*</td>
</tr>
<tr>
<td>Crawford Stents*</td>
<td></td>
</tr>
<tr>
<td>Intubation Sets*</td>
<td></td>
</tr>
<tr>
<td>Spheres*</td>
<td></td>
</tr>
<tr>
<td>Conformers*</td>
<td></td>
</tr>
</tbody>
</table>

### Sterilization Items

- Instrument Wrap
- Autoclave Tape
- Indicators
- Self-seal Pouches
- Disinfectant
- Sharps Container
- Toothbrush
- Non-sterile Gloves
- Lubricant*
Simulation Modules and Learning Objectives

Durham et al. reported that “simulation refers to activities that mimic the reality of a clinical environment and that are designed for use in demonstrating procedures and promoting decision-making and critical thinking. In health care education, simulation can take many forms, from relatively simple to highly complex.”

The following is a compiled list of simulation modules and learning objectives that Orbis designed for training ophthalmic and recovery nurses, as well as the method of simulation employed.

Module Learning Objectives:

Module One: Pre-operative Care

Method: Scenario-Based Learning and IV Arm Task Trainer

Location: Recovery Room

1. Describe the pre-operative patient preparation for:
   a. Marking the surgical site (eye)
   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 pre-operative checks and safety, including:
   a. Patient monitoring
   b. Known allergies
   c. Any systemic disease (e.g., hypertension, diabetes)

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.
Module Two: Post-operative Care

Method: Scenario-Based Learning

Location: Recovery Room

1. Recognize the common anesthetic agents used in the operating room and how they act.
2. Identify the risks for patients recovering from an anesthetic agent.
3. Prepare patient bed area for return from operating room, ensuring relevant equipment is available.
4. Identify the observations required for patients recovering from anesthesia including:
   a. State of consciousness
   b. Cardiovascular and respiratory status
   c. Status of the post-op site
   d. Experience of pain
   e. Maintenance of airway (including the use of aids, e.g., airways)
   f. O2 Therapy
      a. Nasal cannula
      b. Simple mask
      c. Nonrebreather mask
   g. Laryngeal mask
   h. Endotracheal tubes
5. Perform documentation of patient vital signs and report in patient chart.
6. Discuss the rationale and process for regular post-operative observations and checks, and the process for reporting any problems.
7. Manage pain and nausea.
8. Discuss pain scoring, the administration of analgesia, and the techniques available to ensure a pain-free post-operative phase.
9. Describe the link between post-operative care and surgery type.
10. Explain the different patient position needs based on the procedure done in the operating room (OR).
11. Explain the rationale behind the prone position post-operatively.
12. Describe and perform discharge criteria, patient education, and documentation.
Module Three: Instrument Cleaning, Sterilization, and Packing

**Method:** Scenario-Based Learning

**Location:** Sub-sterile Area

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 a machine washer
   c. Application of an ultrasound cleaner
   d. Articulating why lubrication is important to the care of ophthalmic instruments
   e. Identifying necessary characteristics of packaging systems
5. Describe classifications of chemical indicators, and:
   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
Module Four: Scrub and Circulating

Method: Scenario-Based Learning

Location: Operating Room

1. Describe the role and responsibilities of circulator.
2. Discuss the principals of theater etiquette.
3. Describe the role and responsibilities of the scrub nurse.
4. Perform daily and between patient OR cleaning.
5. Demonstrate the ability to discuss safe, effective preparation of the operating theatre with regards to:
   a. The patient
   b. The environment
   c. The staff
6. Describe collection of consumables, instruments, and equipment needed for different subspecialties.
7. Perform pre-surgical handwashing.
8. Perform gowing and gloving (open and closed glove techniques).
9. Perform aseptic technique and setting up of sterile surgical field.
10. Perform prepping and draping of patient.
12. Identify anatomy of the structures of the eye being operated on.
13. Demonstrate knowledge of the disease process of the different subspecialties.
14. Discuss potential hazards during surgery and the precautions necessary to prevent them where appropriate, including:
   a. Swab and instrument policy
   b. Handling of specimens
   c. Diathermy
   d. Laser
   e. Lights
15. Identify the instrument trays used during the different subspecialties.
16. Perform checks of the instrument tray pre- and post-operatively.
17. Discuss the importance of safety checks on all equipment/machines.
18. Discuss and demonstrate the delivery of sterile items to the surgical field to maintain sterility.
19. Demonstrate knowledge of the sequence of the surgery and which instrument used to anticipate surgeon needs.
20. Demonstrate how to assist the surgeon during surgery and pass instruments to the surgeon.
21. Perform handling of sharps on the surgical field and disposal of sharps (and linen when appropriate).
22. Perform handling and disposal of cytotoxic drugs.
23. Perform WHO ‘Sign Out’ Surgical Safety (SS) checklist.
Module Five: Basic Life Support (BLS)

Method: Scenario-Based Learning, IV Trainer Arm, CPR Manikins, and AED Trainer

Location: Classroom

1. Describe the critical concepts of high-quality cardiopulmonary resuscitation (CPR) and its impact on survival.
2. Describe the steps of the Chain of Survival for adult and pediatric patient.
3. Apply the BLS concepts of the Chain of Survival for adult and pediatric patient.
4. Recognize the signs of someone needing CPR.
5. Perform high quality CPR on an adult.
6. Describe the importance of early use of a defibrillator (automated and/or manual) in adult and pediatric patient.
7. Demonstrate the appropriate use of a defibrillator (automated and/or manual).
8. Provide effective airway management:
   a. Head tilt and jaw thrust
   b. Ventilation techniques using a barrier device, pocket mask, Ambu bag (rescue breathing), and with advanced airway in place
9. Recognize what is meant by:
   a. Oral pharyngeal airway
   b. Nasal pharyngeal airway
   c. Laryngeal mask airway (LMA)
   d. Endotracheal intubation
10. Perform high-quality CPR on a child.
11. Perform high-quality CPR on an infant.
12. Describe the importance of team dynamic in multi-rescuer resuscitation:
    a. Roles and responsibilities during a resuscitation attempt
    b. What to communicate
    c. How to communicate
13. Perform as an effective team member during multi-rescuer CPR.
14. Demonstrate how to help a patient with a foreign body airway obstruction in patients of all ages.

For examples of nursing simulation training schedules, see Annexes F-G of the Simulation Center Manual Annexes.
Simulation Training Participant Assessment

Orbis has created some simple tools to assess the competency of nurses following simulation training.

1. **OR Competency Assessment** can be used for nurses participating in the scrub and circulating modules.

2. **Recovery Room Assessment** can be used for nurses participating in the pre and post-op recovery modules.

3. **Sub-sterile Room Assessment** can be used for nurses participating in the instrument cleaning, sterilization and packing module.

4. **BLS examination** can be used for nurses participating in the BLS module.

You can find copies of these assessment tools in Annexes H-K of the Simulation Center Manual Annexes.
Simulation Training in Anesthesia
Proper anesthetic care and the management of critical events in the operating room are essential to patient safety. Simulation plays a vital role in training of anesthesiologists responsible for the delivery of adult and pediatric general anesthesia, as well as local anesthesia during ophthalmic surgery. Therefore, simulation centers should also provide training for anesthesiologists covering ophthalmic cases in the operating theater.

Similar to nursing simulation, anesthesia combines the use of low to high fidelity manikins, task trainers, and scenario-based learning. The UC Davis Center for Simulation and Education Enhancement has an excellent simulation scenario template which can guide the development of these scenarios.

**Simulation Center Equipment**

Simulation in anesthesia dates back to the 1960s, when the University of Southern California introduced the “Sim One.” In the 50+ years that have followed, a number of low and high-fidelity manikins, as well as task trainers, have been developed to facilitate simulation.

This section provides an overview of the equipment recommended for anesthesia simulation training, connected to an Ophthalmic Simulation Center. Note, these range in costs, and hospitals can choose items in line with their budgets. We’ve detailed what we feel is essential versus optional additional equipment, if the budget is available.
<table>
<thead>
<tr>
<th>Type of Simulation</th>
<th>Equipment</th>
<th>Description</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-Fidelity Manikins</td>
<td>Laerdal® Megacode Kid + Simpad Plus + Monitor</td>
<td>A realistic manikin for training in a wide range of pediatric advanced life-saving skills in pre-hospital emergencies.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The Laerdal® ALS Baby™</td>
<td>A portable skill trainer for realistic infant resuscitation training.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Simulaids® Critical Airway Management Trainer (Trauma Head)</td>
<td>Provides training in critical thinking and relevant applications for traumatized airway victims.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trucorp AirSim® Advance X (adult head)</td>
<td>Features the uniquely constructed AirSim® X airway and an anatomically correct nasal passage for visual accuracy and realistic feedback during airway management procedure practice. Silicone simulated skin covering offers a lifelike feel and more precise articulation during bag-valve mask ventilation training.</td>
<td></td>
</tr>
</tbody>
</table>
### High-Fidelity Manikins

**Ideal**

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laerdal® Little Family CPR Manikins</td>
<td>Little Family (Caucasian or African American) is used for effective CPR training. Oral and nasal passages allow realistic nose pinch required for mouth-to-nose ventilation. Natural obstruction of the airway allows students to learn the important technique of opening the airway. Head tilt/chin lift and jaw thrust allow students to practice all maneuvers correctly when resuscitating a real patient.</td>
</tr>
</tbody>
</table>

### Task Trainers

**Ideal**

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simulaids Cricothyrotomy Trainer (Adult &amp; Pediatric Insert)</td>
<td>Designed to practice needle or surgical Cricothyrotomy. Landmarks include thyroid cartilage, cricoid cartilage, and membrane. Inflation of simulated lung verifies correct placement. Includes adult and three-year-old tracheas.</td>
</tr>
<tr>
<td>Cricothyrotomy Homemade Kits</td>
<td>If budget is restricted, a simple homemade version of a cricothyrotomy trainer can be made using low cost items, including: 1. Plastic kidney dish x2 2. 20cm of corrugated breathing circuit 3. The barrel of a 20ml syringe 4. Medical tape 5. Plastic bag or reservoir bag 6. Piece of foam For more details on how to create this homemade cricothyrotomy task trainer, please visit: <a href="http://www.simcentral.com.au/surgical_airway">www.simcentral.com.au/surgical_airway</a></td>
</tr>
</tbody>
</table>

**Essential**

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORSIM Fiberoptic Bronchoscopy Simulator</td>
<td>The ORSIM Bronchoscopy Simulator provides comprehensive training for a common diagnostic procedure, which until now has required lengthy specialist training. The range of high definition virtual anatomy and pathology allows users to develop the skills, dexterity and knowledge to operate a clinical flexible bronchoscope to the highest standard.</td>
</tr>
</tbody>
</table>

**Ideal**

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laerdal® IV Arm (Infant)</td>
<td>Designed to teach and practice venipuncture in antecubital fossa and dorsum of hand. Simulated blood may be infused for realistic flashback.</td>
</tr>
<tr>
<td>Laerdal® IV Leg (Infant)</td>
<td>Designed for training extremity venipuncture procedures and intravenous fluid administration in the superficial veins in the foot.</td>
</tr>
</tbody>
</table>
The arm is an exact reproduction of the arm of a six-year-old child. It is used to practice venipuncture and intramuscular injection techniques and procedures used in young children. The pediatric arm provides a realistic sensation and response. The lifelike vinyl skin rolls as you palpate to locate the vein. The synthetic rubber tubing used for the veins provide a lifelike simulation of vein size and feeling of puncture and palpation for practicing venipuncture. A soft foam is used to simulate the deltoid muscle and allows the student to “get the feel” of administering intramuscular injections to children. Simulated bone in the shoulder defines and limits the injection area. Water may be used as an injection fluid in the shoulder area.

For use with Vidacare EZ-IO procedures. The bones come with skin patch to allow practice for the insertion of the EZ-IO needles. Bones: Humeral Head (Adult); Distal Right Tibia (Adult); Proximal Tibia (Adult); Tibia (Pediatric); Tibia (Infant).

Simulation Center Supplies and Consumables

In this section we highlight some key supplies and consumables required for the simulation training.

Equipment Lists & Skill Station set-up

1. **Adult CPR**
   - Adult torso
   - Defib
   - iPad /iPhone with Sim Mon app
   - Adult BLS/ALS algorithms

2. **Laerdal® Kid Manikin Simulation**
   - Laptop + Manikin + SimPad/Simbox/Leads, etc. + Router
   - LMA 2.5 single use
   - ETT 4/5.5 + laryngoscope + Mac 3
   - Facemask + Guedel + Ambu® child
   - Drug syringe set
Pediatric Airway
- Pediatric heads: neonate + baby
- Videolaryngoscope CMAC
- Facemask sizes 1 & 2
- Guedel sizes 50 & 70mm
- ETT 3 & 4.5mm
- Bougie 10Ch
- Ambu® child & neonate
- LMA #1 & 2 classic
- Laryngoscope + Miller & Mac blades
- Stylettes
- LMA #1 & 2 classic
- Laryngoscope + Miller & Mac blades
- Stylettes

Adult Airway
- Adult head
- Facemask size 4
- Guedel 90 & 100mm
- ETT 7 & 8mm
- Bougie 15Ch
- Ambu® adult
- LMA 4 classic + iGel #3 + LMA Supreme #5 + iLMA #4
- Laryngoscope + Mac + McCoy blades
- Videolaryngoscope King Vision & AirTraq
- Stylette

ORSIM
Nothing else

Cricothyrotomy
- Crico trainer: Homemade & commercial
- Ambu® child
- Needle crico
  - 14/16G cannula + 5ml syringe
  - 2ml syringe + 7mm ET connector
  - 3mm ETT connector
  - 10ml syringe + 6 or 7mm ET
  - 3-way tap + O₂ tubing
- Surgical crico
  - 10 blades + scalpel
  - 15 bougie
  - 6mm ETT
Simulation Modules and Learning Objectives

The anesthesia simulation program described in this section is designed to provide an intensive, immersive one-day experience. The overall goals at the completion of the program are for the learners to be able to put into practice basic safety principles applied to perioperative care and to ensure a safe environment for surgical care. The training also provides a foundation for their personal development relevant to the management of critical events during pediatric ophthalmic surgery.

As previously mentioned in the manual, Orbis emphasizes the benefits of the safety, communication, and avoidance of distraction standards of the aviation industry, and adapts many of their safety protocols and standardized checklists for use in anesthesia simulation training.

The following is a compiled list of simulation modules and learning objectives that Orbis designed for training anesthesia residents.

**Module Learning Objectives:**

**Anesthesia Simulation**

1. Reinforce the safety principles applied to perioperative care.

**Module One: Anesthesia Equipment Safety Checks and Safety Features**

1. Demonstrate knowledge of equipment safety checks:
   a. What to check
   b. When to check
2. Discuss the importance of checklists.
3. Discuss the importance of daily checks and between-patient checks.
4. Perform a full equipment check before starting first anesthetic.

**Module Two: Operating Room Set-up, Organization and Orientation**

1. Organize service condition and back-up systems supporting patient care, including:
   a. Gas supply line
   b. Gas cylinders
   c. Power supply (emergency power, backup battery)
   d. Redundancy to address first line system failures
2. Organize workspace ergonomics and adjust anesthesia equipment relative to operating bed and patient position.
Module Three: Basics of an Ophthalmic General Anesthetic

1. Develop an anesthesia management plan in accordance with the patient scenario described. The plan includes:
   a. Performing pre-operative assessment
   b. Describing pre-operative fasting guidelines
   c. Discussing anesthetic risks specific to the patient, including physical status and pre-existing conditions
   d. Discussing pros & cons of parental presence in the operation room
   e. Discussing the indications, contradictions and use of LMA vs. endotracheal
   f. Discussing the use of gas induction vs. IV induction
   g. Discussing the use of analgesics and antiemetics
   h. Discussing prophylactic adjunctive medications including analgesics & antiemetics

2. Perform anesthesia in accordance to plan developed and patient scenario described.

3. Manage anesthesia emergence including:
   a. Immediate phase 1 recovery:
      i. Airway management
      ii. Oxygenation
      iii. Pain control
      iv. Preventative measures to address common immediate post-operative complications: emergence delirium, respiratory depression, hypoxia, cardiovascular events (hypotension, hypertension, bradycardia) and vomiting

4. Demonstrate management of the difficult airway using the infant (Pierre-Robin, AirSim®) manikin and child airway trainer, including:
   a. Developing skills in airway assessment (Mallampati score, airway grade, neck mobility, general appearance, specific conditions including Goldenhar syndrome)
   b. Demonstrating difficult airway algorithm in anesthetic planning and care
   c. Performing various advanced airway management techniques including: fiberoptic laryngoscope, airway guidewires, and introducers, emergency cricothyroidotomy procedures, and equipment

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b Recommend that training on emergency cricothyroidotomy guidelines and equipment be covered during this part of the anesthesia simulation training. As a guide, we suggest using the Difficult Airway Society’s (DAS) 2015 Difficult Intubation guidelines, which you can find at: https://das.uk.com/files/das2015intubation_guidelines.pdf
Module Four: Anesthesia Emergencies

Develop a self-study plan to guide further training and education through the following anesthesia emergencies addressed by the Simulated Clinical Experience (SCE):

Anaphylaxis

1. Describe reactions to different drugs.
2. Discuss incidence of anaphylaxis.
3. Identify the likely causes.
4. Recognize the state of anaphylaxis.
5. Perform emergency care.
6. Perform care after recovery from anaphylaxis episode.

Intraoperative Bradycardia

1. Articulate how to monitor cardiovascular system.
2. Define bradycardia.
3. Identify causes of bradycardia during anesthesia including specific to ophthalmic cases.
4. Describe management of intraoperative bradycardia.

Oxygen Failure in the Operation Room

1. Describe sources of oxygen in the operation room.
2. Identify other oxygen sources available in the operation room.
4. Management of oxygen failure in the operation room.

Cardiac Arrest in the Operation Room

1. Describe the types of cardiac arrest rhythm.
2. Identify the causes of cardiac arrest in the operation room.
3. Demonstrate the Advanced Life Support Algorithm.
4. Describe what drugs to be used.
5. Demonstrate use of defibrillator.

Difficult Intubation Scenario

1. Perform a basic airway assessment.
2. Perform preparation for a tracheal intubation - basic equipment.
3. Identify additional equipment required to manage difficult airways.
4. Discuss the importance of Plan ABCD.
5. Demonstrate management of the Can't Intubate Can't Oxygenate (CICO) scenario.
Acute Bronchospasm

1. Demonstrate how to manage a child with asthma scheduled for surgery.
2. Articulate the frequency of upper respiratory infection (URI) in healthy children, and the risks, precautions, and management of child with URI.
3. Perform pre-operative preparation of child with history of asthma.
4. Recognize critical events that may trigger acute bronchospasm during perioperative care.
5. Demonstrate management of severe bronchospasm during surgery.
6. Identify complications of acute bronchospasm and their management including barotrauma.
7. Demonstrate management of pneumothorax including intercostal catheter placement to underwater drain.
8. Manage recovery room and post-operative recovery.

Acute Laryngospasm/Hypoxia

1. Understand conditions that may precipitate acute laryngospasm and measures to prevent its occurrence.
2. Identify background factors that may predispose a child to laryngospasm under anesthesia (recent URI, asthma history, smoker in family, living conditions).
3. Recognize key events during anesthesia that may trigger acute laryngospasm.
4. Provide timely management of acute laryngospasm and its complications.
5. Able to initiate timely advanced life support.

Local Anesthetic Systemic Toxicity (LAST)

1. Understand conditions that may precipitate LAST and measures to prevent its occurrence.
2. Identify maximum dosages of various local anesthetics.
3. Recognize background factors that may predispose a patient to LAST.
5. Able to initiate timely advanced life support.

For sample schedules of one-day simulation trainings in anesthesia, please see Annexes L-M of the Simulation Center Manual Annexes.
Simulation Training Participant Assessment

Orbis has created a simple post-simulation exam to assess the knowledge of anesthesia residents following simulation training. This 20-question exam covers the key learning objectives of the simulation training.

You can find a copy of the anesthesia skills examination in Annex N of the Simulation Center Manual Annexes.
Simulation Training
Debriefing

Evidence shows that debriefing post-simulation provides critical learning. Formative feedback and reflection helps residents to understand the strengths and weaknesses of their performance during the simulation. Therefore, by integrating debriefing into simulation center training, you heighten the participant’s experience, self-awareness, and understanding of the skills and knowledge covered.

The following standards should be applied to debriefing:

1. The debrief is facilitated by a person(s) competent in the process of debriefing.
2. The debrief is conducted in an environment that is conducive to learning and supports confidentiality, trust, open communication, self-analysis, feedback, and reflection.
3. The debrief is facilitated by a person(s) who can devote enough concentrated attention during the simulation to effectively debrief the simulation-based experience.
4. The debrief is based on a theoretical framework for debriefing that is structured in a purposeful way.
5. The debrief is congruent with the objectives and outcomes of the simulation-based experience.
Some recommended debriefing tools include:

### PEARLS:
**Promoting Excellence and Reflective Learning in Simulation (PEARLS)** provides a scripted debriefing tool, which combines learner self-assessment, facilitated focused discussion, and the provision of direct feedback. An example of a script used, based on the PEARLS tool, can be found in Annex O in the resources section of this manual.

<table>
<thead>
<tr>
<th>Objective</th>
<th>Task</th>
<th>Sample Phrases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting the Scene</td>
<td>Created safe context for learning</td>
<td>Talk about the goals of debriefing, our purpose is to improve how we work together, what went well, what didn’t, what we could have done better.</td>
</tr>
<tr>
<td>Reactions</td>
<td>Identify reactions</td>
<td>“Did you feel challenged?” “Was this too much?”</td>
</tr>
<tr>
<td>Description</td>
<td>Clarify events</td>
<td>“Can you recall the key events in the case?” “What did others say?”</td>
</tr>
<tr>
<td>Analysis</td>
<td>Explore variety of performance domains</td>
<td>See feedback of what they think went well</td>
</tr>
</tbody>
</table>

### SHARP:
**SHARP:** Is a simple and quick method of providing structured debriefing. The tool provides five prompts that ensure the most important points are reviewed.30

- **Before case:**
  - Set learning objectives: What would you like to get out of this case?

- **After case:**
  - How did it go?: What went well? Why?
  - Address concerns: What did not go so well? Why?
  - Review learning points: Were your learning objectives met for this case? What did you learn about your clinical/technical skills? What did you learn about your teamwork skills?
  - Plan ahead: What actions can you take to improve your future practice?

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*The PEARLS Healthcare Debriefing Tool has been reproduced with permission from Academic Medicine.*
Running a Simulation Center

A simulation center’s success is contingent on proper management, committed trainers, and allocated time for learners to use the facilities. This section covers general recommendations and tips for maximizing the impact of a simulation center.

Human Resources

Simulation centers require dedicated trainers with the capacity to deliver the proposed training activities.

The key criteria for simulation trainers are the:

- Expertise in the technique/skills being taught in the simulation.
- Experience teaching beginners who may have little to no surgical or clinical experience.
- Ability to provide interactive lectures and hands-on instruction in the simulation center.
- Familiarity with and ability to do simple troubleshooting with simulation center equipment (e.g., microscopes).
- Knowledge of setting learning objectives, providing objective assessments, delivering structured feedback, and facilitating structured debriefing.
- Ability to guide and support learners to reach the intended learning objectives.
- Capacity for flexibility and problem-solving skills if resources or infrastructure fails (e.g., back-up plans for teaching and practicing if the generator fails and there is a black out).
As previously mentioned, it is vital to have a structured program/training design for a simulation center to be successful.

This manual has provided some examples and resources that can be adapted to create a simulation program and structured curriculum at your facility.

Additionally, Annexes R-X of the Simulation Center Manual Annexes have several sample curricula/training schedules to consider.

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\(^d\) Note that this requires that residents, nurses, and other eye health professionals participating in simulation training are given time in their workday to participate in simulation training.
Blended-Learning

Orbis has successfully piloted and scaled up a number of blended-learning training initiatives globally, demonstrating that combining online with in-person learning best accomplishes educational objectives and builds skills more effectively. By assigning online pre-learning tasks and assignments to students to complete in advance, teachers are able to focus on more critical skill-building techniques in person and tailor the training to be personalized for each learner.

Through our online educational system embedded within Cybersight, learners can access our library of resources, watch live lectures or surgical demonstrations, and/or enroll in educational courses in-line with availability and at the learner’s own pace. When utilizing learning materials such as courses, students can easily track their progress and see their knowledge levels improve by taking pre- and post-course tests.

To date, Orbis has course modules in a variety of topics, including Glaucoma, Pediatric Ophthalmology and Strabismus, Cataract (Phacoemulsification and Manual Small Incision Cataract Surgery), Diabetic Retinopathy, Diabetic Retinopathy Image Photography, and Ophthalmic Nursing. It’s highly recommended that participants enroll in relevant course modules on Cybersight prior to the simulation training sessions. For educators, all blended-learning curricula can be found in the Cybersight Library, under the “Ophthalmic Educators Resources” folder.
Simulation Training Resources

Orbis has developed a number of simulation resources over the years that might serve as a guide for developing a program for your simulation center. All Orbis resources can be reproduced and adapted for educational purposes, as long as Orbis is referenced and credited. All resources are included as Annexes for your reference.

In addition to the Annexes, we recommend the following websites:

- The Iowa Ophthalmology Wet Laboratory
- Simulated Ocular Surgery
- International Council of Ophthalmology
- Orbis International Cybersight
- The Virtual Cataract Surgery Course Manual for Ophthalmology Residents 2016 Edition
- Clinical Simulation in Nursing
- UC Davis Center for Simulation and Education Enhancement
- International Network for Simulation-based Pediatric Innovation, Research, & Education (INSPIRE)
- International Association for the Prevention of Blindness (IAPB) Essential List for Simulation-Based Learning (Cataract Surgery)
- University of Iowa: How to Set-up a Wet Lab Video
Appendix 1.

Simulation Center Equipment Resources (URLs)

This is a list of suggested equipment for outfitting simulation centers; URLs may no longer be valid. However, the original description and listed purpose of the item (in the document) should be sufficient to identifying appropriate available equipment.

Simulation Resources

- The Iowa Ophthalmology Wet Laboratory: http://webeye.ophth.uiowa.edu/eyeforum/tutorials/Iowa-OWL/index.htm
- Simulated Ocular Surgery: http://simulatedocularsurgery.com/
- Orbs International Cybersight: www.cybersight.org
- The Virtual Cataract Surgery Course Manual for Ophthalmology Residents 2016 Edition: https://repository.library.brown.edu/studio/item/bdr:583598/
- Clinical Simulation in Nursing: https://www.journals.elsevier.com/clinical-simulation-in-nursing
- UC Davis Center for Simulation and Education Enhancement: https://health.ucdavis.edu/simulation/
- University of Iowa: How to Set-up a Wet Lab Video: https://www.facebook.com/watch/?v=177178886140

Electrical

- Surge protectors, as needed https://www.amazon.com/Tripp-Lite-Protector-Right-Angle-ISOBAR6ULTRA/dp/B0000S13US/
### Microscopes

- **Model D Stereo Microscope**  

- **ZEISS Stemi 305 EDU**  

- **Scanoptics SO-1700W**  

- **INAMI – LO940SD**  

- **Zeiss OPMI Lumera 300**  

### Phacoemulsification Machines

- **APPASAMY Phacoemulsification with Victrectomy System**  

- **Alcon Laureate**  

### Task Trainers and Manikins

- **Laerdal® Little Family CPR Manikins**  

- **Laerdal® Male Multi-Venous IV Training Arm**  

- **Nasco Life/form® IV Puncture Arm (Pediatric)**  
  [https://www.enasco.com/p/%3Cstrong%3ELife-form®%3Cstrong%3E-Pediatric-Arm---Light%2BLF00958](https://www.enasco.com/p/%3Cstrong%3ELife-form®%3Cstrong%3E-Pediatric-Arm---Light%2BLF00958)

- **Laerdal® AED Trainers**  

- **Laerdal® MegaCode Kid + SimPad® Plus + Monitor**  

- **Laerdal® ALS Baby™**  

- **Life/form® “Airway Larry” Airway Management Trainer**  

- **Critical Airway Management Trainer (Trauma Head)**  
• Trucorp AirSim® Advance X (adult head)
  https://www.trucorp.com/P/52/AirSimAdvanceX

• Trucorp AirSim® Pierre Robin X
  https://www.trucorp.com/P/55/AirSimPierreRobinX

• Trucorp AirSim® Child Bronchi X
  https://www.trucorp.com/P/57/AirSimChildBronchiX

• Simulaid Cricothyrotomy Trainer (Adult & Pediatric Insert)
  https://www.theemsstore.com/store/product.aspx/productId/1379

• ORSIM Fiberoptic Bronchoscopy Simulator
  https://www.intelligentultrasound.com/orsim-5/orsim-6/

• Laerdal® IV Arm (Infant)
  https://www.laerdal.com/us/item/365-00301

• Laerdal® IV Leg (Infant)

• Vidacare EZ-IO Training Bones
  https://www.teleflexvascular.com/products?per_page=10&page=1&taxon=27&filter%5Bitem type%5D%5B%5D=Training
References


VRMagic [Internet]. Mannheim (Germany); c2020. Eyesi® Surgical. [cited 2020 April 15.] Available from https://www.vrmagic.com/medical-simulators/eyesi-surgical


# Annexes

All the below annexes can be found in the *Simulation Center Manual Annexes* alongside this manual.

<table>
<thead>
<tr>
<th></th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Artificial Model Eye Product Guide</td>
<td>07</td>
</tr>
<tr>
<td>C</td>
<td>Sample Evaluation Form Basic Eyesi® Cataract Course</td>
<td>08</td>
</tr>
<tr>
<td>D</td>
<td>Sample Evaluation Form Advanced Eyesi® Cataract Course</td>
<td>09</td>
</tr>
<tr>
<td>E</td>
<td>Guide to Nursing Simulation Station Set-Up</td>
<td>11</td>
</tr>
<tr>
<td>F</td>
<td>Sample Nursing Recovery Room and Sub-sterile Simulation Training Schedule</td>
<td>16</td>
</tr>
<tr>
<td>G</td>
<td>Sample Nursing OR Simulation Training Schedule</td>
<td>18</td>
</tr>
<tr>
<td>H</td>
<td>Nursing OR Competency Assessment</td>
<td>20</td>
</tr>
<tr>
<td>I</td>
<td>Nursing Recovery Room Competency Assessment</td>
<td>22</td>
</tr>
<tr>
<td>J</td>
<td>Nursing Sub-Sterile Competency Assessment</td>
<td>26</td>
</tr>
<tr>
<td>K</td>
<td>BLS Examination</td>
<td>27</td>
</tr>
<tr>
<td>L</td>
<td>Anesthesia Simulation Training Example One</td>
<td>29</td>
</tr>
<tr>
<td>M</td>
<td>Anesthesia Simulation Training Example Two</td>
<td>31</td>
</tr>
<tr>
<td>N</td>
<td>Anesthesia Skills Examination</td>
<td>33</td>
</tr>
<tr>
<td>O</td>
<td>Sample Debriefing Script</td>
<td>35</td>
</tr>
<tr>
<td>P</td>
<td>Sample Logbook</td>
<td>36</td>
</tr>
<tr>
<td>Q</td>
<td>Recommendations for Simulation Instructor Professional Development</td>
<td>37</td>
</tr>
<tr>
<td>R</td>
<td>Orbis MSICS Wet Lab Course Outline</td>
<td>40</td>
</tr>
<tr>
<td>S</td>
<td>Orbis VR Eyesi® Vitreoretinal Course</td>
<td>53</td>
</tr>
<tr>
<td>T</td>
<td>Orbis VR Eyesi® Advanced Cataract Course</td>
<td>56</td>
</tr>
<tr>
<td>U</td>
<td>Orbis VR Eyesi® Basic Cataract Course</td>
<td>58</td>
</tr>
<tr>
<td>V</td>
<td>Wet Laboratory Manual for Ophthalmology Residents in Ethiopia</td>
<td>61</td>
</tr>
<tr>
<td>W</td>
<td>Orbis MSICS Wet Lab Curriculum</td>
<td>101</td>
</tr>
<tr>
<td>X</td>
<td>Sample Wet Lab Training Schedule</td>
<td>116</td>
</tr>
</tbody>
</table>
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