

# TRAINING COURSE IN PEDIATRIC OPHTHALMOLOGY AND STRABISMUS

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### **As a note:**

*All materials presented in this course are from a collaboration of doctors, researchers, reviewers, as well as text books, journals, and videos. Our contributors are the authors of their original works, listed below, and hold the rights to them. Their willingness to contribute their original works to form the content for the three courses made the creation of this module possible, and we are grateful for their continued efforts to train doctors around the world.*

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Assessing Binocular Vision. Ppt. *Authored by Dan Neely, MD.*

Basic Strabismus Surgery: Rectus Recession and Resection. *Authored by Dr. Ronald Price, American Academy of Ophthalmology*

Binocular Vision and Ocular Motility, Sixth Edition, Chapters 3, 4 and 18 *Authored by Noorden and Campos, MD Available by Cybersight*

Disorders of the Nervous System: A Primer, Chapter 4. *Authored by Alexander G. Reeves, MD and Rand S Swenson, MD, PhD*

Estimation Techniques. PPT *Authored by Dan Neely, MD*

Evaluation and Management of Pediatric Glaucoma. Ppt *Authored by* Dan Neely, MD.

Evaluation and Management of Superior Oblique. Ppt *Authored by* Dan Neely, MD.

Fundamentals of Strabismus. Ppt *Authored by* Dan Neely, MD.

Glaucoma: Cyclodestruction. American Academy of Ophthalmology. *Authored by* Dr. Elena Bitrian and Dr. Sharon F Freedman.

Laboratory Evaluation of Pediatric Cataract Patients. Ppt *Authored by* Dan Neely, MD.

Pediatric Ophthalmology: A Clinical Guide. Chapters 1,2,3 and 4. *Edited by* Pamela Gallin and Ilene Pardon, MD

Refraction and Refractive Errors in Children. Ppt. *Authored by* Dan Neely, MD.

Retinoscopy and its principles. Ppt. *Authored by* Dr. Thakur, Laxmi Eye Institute.

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Surgical Management of Strabismus, Chapters 3, 7, 8, 9 and 13. *Authored by* Eugene Helveston,  
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Visual Acuity Screening Guidelines. Ppt. *Authored by* Dan Neely, MD.

#### **Video Contributors:**

“Retinoscopy” Dr. David Guyton, American Academy of Ophthalmologists

“Posterior Continuous Capsulorhexis” Nihal Shakankiri, MD.

“Strabismus Surgery: Superior Oblique Tuck” Dr. John Ferris, American Academy of Ophthalmology

“IO Anterior Transposition” Dan Neely, Cybersight.

“Traction Test. Brown Syndrome Pre-Op” Daniel Neely, MD

“Traction Test. Brown Syndrome Post Op” Daniel Neely, MD

“Evaluation and Management of Pediatric Glaucoma” Daniel Neely, MD

“Primary Congenital Glaucoma” Dr. Wallace Alward, Iowa Glaucoma Curriculum.

“Surgery for Glaucomas of Infancy” Dr. Wallace Alward, Iowa Glaucoma Curriculum.

“Trabulectomy” Dr. Wallace Alward, Iowa Glaucoma Curriculum.

“Glaucoma Drainage Devices” Dr. Wallace Alward, Iowa Glaucoma Curriculum.

“Cyclodestructive Procedures” Dr. Wallace Alward, Iowa Glaucoma Curriculum.

**Image Contributors:**

Glaucoma: Cyclodestruction. American Academy of Ophthalmology. *Authored by* Dr. Elena Bitrian and Dr. Sharon F Freedman.

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## Introduction

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

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

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

Today, Orbis regularly delivers training in 16 countries where we have established multi-year projects, as well as short training courses through the Flying Eye Hospital and hospital based trainings in Asia, Africa and Latin America.

### Course Objective:

**This course is designed to train ophthalmologists in the management and treatment of pediatric eye disease as well as strabismus in both children and adults.**

Pediatric blindness is a significant contributor to the global economic burden of blindness and disability-adjusted life years. It is important that ophthalmic surgeons can appropriately manage pediatric eye diseases, which includes the ability to safely perform pediatric surgery as well as perform the full pre- and postoperative examination of the pediatric or adult strabismus patient, retinoscopic refraction, amblyopia treatment, and frequent follow-up visits necessary to monitor the visual acuity and ocular health.

This course aims to provide ophthalmologists with the following competencies:

1. Full Evaluation of the pediatric patient and the adult strabismus patient (Module One)
  - ✓ Ability to obtain an appropriate history specific to pediatric ophthalmology as well as strabismus in both children and adults.

- ✓ Knowledge of the specific examination elements critical to pediatric ophthalmology and strabismus.
  - ✓ Knowledge of appropriate age-specific visual acuity testing formats and optotypes in children.
  - ✓ A basic knowledge of strabismus sensory testing (stereopsis, Worth 4 dot).
  - ✓ Proficiency in measuring strabismus using cover-testing and prism rather than estimation techniques.
  - ✓ Basic documentation of strabismus in the primary position, with both distance and near fixation. Familiarity with standard abbreviations for describing deviations.
  - ✓ Proficiency in performing cycloplegic retinoscopy for refraction of children.
  - ✓ Demonstration of an appropriate understanding of refractive error correction in pediatric patients, particularly those with strabismus.
  - ✓ Proficiency in the performance of indirect ophthalmoscopy in children.
  - ✓ Proficiency in presenting a case history and appropriate exam elements to Cybersight Consult, including uploading strabismus photos.
2. Basic Strabismus (Module two)
- ✓ Proficiency in assessing and recording ocular motility, versions, and ductions when planning strabismus surgery.
  - ✓ Proficiency in appropriately recording strabismus measurements:
    - Mastery of abbreviations for accurately describing deviations.
    - Grid diagrams for horizontal and vertical deviations in the 9 positions of gaze plus with head tilting.
  - ✓ Knowledge of pattern strabismus, A- and V-patterns in particular.
  - ✓ Knowledge of the advantages and disadvantages of both limbal and fornix incisions for strabismus surgery.
  - ✓ Knowledge of the surgical instruments (hooks, scissors, needle holders, retractors) comprising a basic strabismus surgical set.
  - ✓ Knowledge of the appropriate sutures and needle types for strabismus surgery.
  - ✓ Knowledge of basic surgical dose-response tables and how to use them.
  - ✓ Ability to perform basic horizontal muscle surgery using limbal incisions to perform recessions (fixed and hang-back), resections and plications for conditions such as:
    - Esotropia (congenital, refractive with residual, nonrefractive).
    - Exotropia (intermittent exotropia, decompensated XT)
    - Up and down-shifting of horizontal rectus muscles for A- and V-patterns and small hypertropias.
  - ✓ Ability to perform basic muscle transposition procedures:
    - Full or split-tendon transposition for conditions such as 6th nerve palsy and monocular elevation deficiency (double-elevator palsy) or lost/lacerated rectus muscles.
  - ✓ Ability to comfortably use surgical loupes in the operating theater.

- ✓ Demonstration of consistently using Cybersight Consult on a regular basis (minimum of 1 case per month) for mentor feedback and continuing medical education.
- 3. Pediatric Cataract (Module three)
  - ✓ Knowledge of the basic laboratory tests that are useful in some cases of pediatric cataract.
  - ✓ Describe and apply the principles, indications for, mechanics of, and performance of IOL calculation for pediatric patients, including the calculation of post-operative IOL target refractive errors.
  - ✓ Proficiency in using the vitrector for anterior capsulotomy, lens aspiration and primary posterior capsulotomy in children age 5 years and younger.
  - ✓ Knowledge of the benefits and disadvantages of different IOL styles in pediatric cataract surgery.
  - ✓ Understand the importance of a primary posterior capsulotomy in children age 5 years and younger.
  - ✓ Independently perform routine pediatric cataract surgery with and without IOL implantation.
  - ✓ Manage intraoperative and postoperative complications of pediatric cataract surgery.
- 4. Advanced Strabismus (Module four)
  - ✓ Proficiency in performing routine strabismus surgery in children and younger adults via a fornix incision.
  - ✓ Knowledge of dissociated strabismus conditions.
    - Dissociated vertical deviation.
    - Dissociated horizontal deviation.
  - ✓ Proficiency in identifying and surgically managing conditions involving the Inferior Oblique.
    - Inferior Oblique recession.
    - Inferior Oblique myectomy.
    - Inferior Oblique anterior transposition.
  - ✓ Proficiency in evaluating disorders of the Superior Oblique (4th nerve palsy and Brown syndrome):
    - Three-step test evaluation for vertical deviations.
    - Measuring torsion with a double-Maddox rod.
    - Superior Oblique traction testing.
  - ✓ Knowledge of surgical strategies for management of Superior Oblique palsy.
    - Understanding how the management of bilateral Superior Oblique palsy is different from unilateral palsies.
    - Understanding of Harado-Ito procedure for torsion.
  - ✓ Knowledge of how Superior Oblique tuck and guarded tenotomy are done.
  - ✓ Proficiency performing Superior Oblique tenotomy.
  - ✓ Proficiency in identifying the different types of Duane syndrome and identifying indications for surgery.

- ✓ Knowledge of the basic management concepts for cases of restrictive strabismus.
  - Duane syndrome.
  - Thyroid myopathy.
  - Fibrosis syndrome.
- ✓ Understanding the appropriate use of Botox for 6th nerve palsy.
- ✓ Knowledge of surgical treatment strategies for 3rd nerve palsy.
- ✓ Understanding of basic adjustable suture strabismus surgery technique.
- 5. Pediatric Glaucoma (Module five)
  - ✓ Knowledge of the presenting signs and pathogenesis of congenital glaucoma.
  - ✓ Knowledge of the typical forms of secondary glaucoma affecting children.
  - ✓ Proficiency in performing an examination under anesthesia for pediatric glaucoma.
  - ✓ Knowledge of the safety profile of glaucoma medications in children.
    - Brimonidine in particular.
  - ✓ Knowledge of the angle surgery treatment strategies for congenital glaucoma
    - Trabeculotomy
    - Goniotomy
    - Tube-shunt
  - ✓ Proficiency in performing trabeculotomy and tube-shunt surgery.
  - ✓ Knowledge of how to perform goniotomy and trabeculectomy surgery.
  - ✓ Understanding of the pros and cons of trabeculectomy with and without antimetabolites in children.
  - ✓ Knowledge of the various cyclo-destructive procedures in children.
- 6. Retinoblastoma (Module 6)
  - ✓ Evaluation, staging and selection of appropriate treatment options for new RB patients
  - ✓ Proficiency in performing enucleation
  - ✓ Proficiency in performing cryotherapy
  - ✓ Proficiency in performing local laser therapy
  - ✓ Knowledge of systemic and intra-arterial chemotherapy

## Course Duration:

6 weeks onsite (plus continual tele-education via Cybersight starting at one month prior to first onsite module and up to two months post course mentorship).

## Target Audience:

This course has been developed for consultant ophthalmologists specializing in pediatric ophthalmology who dedicate the majority of their practice to pediatric patients.

## Course Application:

Can be effectively delivered by Orbis International through five 1-week HBPs or one 5-week combined FEH and HBP project (please refer to course outline and schedule below). Prior to the start of each on-sight training module, pre-learning educational materials will be available through Cybersight®. For three months following the last on-sight training, tele-mentorship and monitoring of surgical cases will be available through Cybersight®.

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

1. Creation of or strengthening of high quality pediatric eye care services
2. Reduction of childhood blindness
3. Building the capacity of secondary eye hospitals to examine, treat and refer pediatric cataract cases

## Training Ratios and Surgical Volume:

For trainees completing the entire course, the ideal training ratio is one VF mentor to two ophthalmologists. Therefore, hospital-based trainings, should limit the participants to two ophthalmologists. However, additional ophthalmologists can participate in the non-surgical components of the training, including: wet lab, structured classes, surgical demonstrations, and investigative ophthalmology workshops. For the non-surgical training, it's recommended to have one VF to 6-10 ophthalmologists.

The FEH has the ability to deliver training in two locations, both the FEH OR and at the partner institution. They are also able to recruit 3-4 VF mentors per week. Therefore, the FEH can accommodate a larger number of ophthalmologists completing the full course (8-10). The FEH can also accommodate additional ophthalmologists who wish to participate in the non-surgical training. The exact number of ophthalmologists should be determined based on space available for training, number of VFs and expected surgical volume.

The target for surgical volume is at least 5 cases per trainee per on-site module. With five weeks of surgical training, trainees should be able to garner at least 20-25 cases before the end of the course. If integrated into longer-term training plans, consider continued mentorship in pediatric ophthalmology for up to 50 surgical cases for strabismus, 10 surgical cases of pediatric cataract (at least 5 cases in patients under the age of five), and 10 glaucoma cases.

## Adaptability:

This course is designed as one-week modules, each focusing on specific competencies and progressing in complexity. As such, it can be adapted to match the needs and

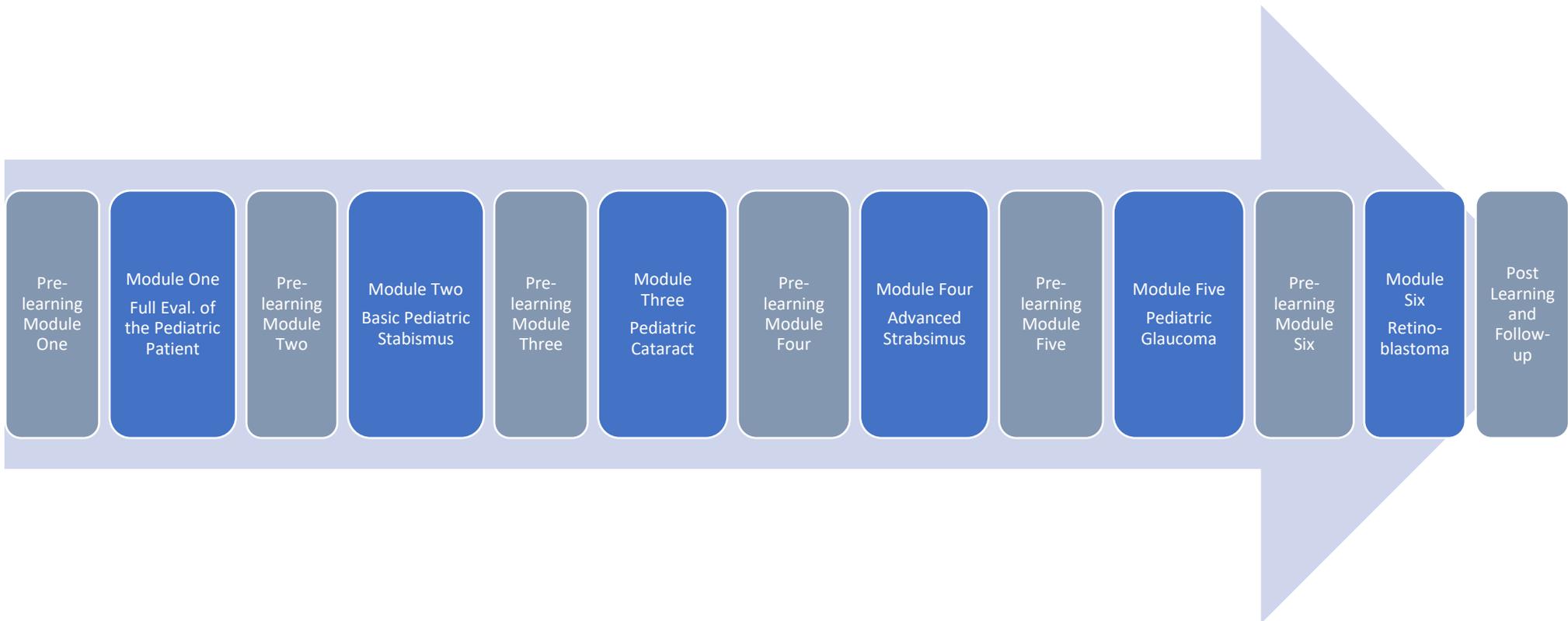
skills of participant ophthalmologists from partner institutions. For example, if participant ophthalmologists are more advanced and have strong clinical knowledge and skills, the training can be designed to start at module two. Alternatively, if participants are quite basic or beginners, module one can be repeated until judged that the competencies have been met and they are ready to progress to the next module. Program managers have the flexibility to tailor this pediatric ophthalmology and strabismus course to the skill level and needs of their partners.

Further, if the focus of the project is one particular area of pediatric ophthalmology, ex. strabismus, program managers can choose to only deliver the courses that are related to pediatric strabismus.

**Course Outline & Schedule:**



Sequence of Training: Integrated Tele-Education and On Site Practical Training



## Pre Learning Module One

One month prior to the start of the first on-site training module, registered participants will access educational content and training materials through Cybersight®.

### Pre-learning materials include:

- ✓ Pre-examination for Pre-Learning Module One
- ✓ Didactic Learning: See topics in text box
- ✓ Demonstration Videos on:
  - Examination of pediatric patients
  - Retinoscopy
  - Indirect ophthalmoscopy
  - Evaluation, measurement, and treatment of basic strabismus including: Esotropia (refractive, nonrefractive and congenital esotropia), Exotropia (intermittent exotropia) and introduction to Inferior Obliques (Inferior Oblique overaction, V-patterns, recognizing dissociated vertical deviation-DVD)
  - Refraction
- ✓ Pediatric eye examination guidelines
- ✓ Glasses prescription guidelines
- ✓ Amblyopia treatment guidelines
- ✓ Orbis Essential Equipment List for Pediatric Surgeries
- ✓ Post-Examination for Pre-Learning Module One

#### Learning Topics

##### Lesson 1

- 1.1 History Taking, Visual Acuity and Strabismus Testing
- 1.2 Visual Acuity Testing in Pediatric Patients
- 1.3 Motor and Sensory Testing
- 1.4 Measurement of Deviation
- 1.5 Documentation of Strabismus

##### Lesson 2

- 2.1 Refractive Error in Pediatric Patients
- 2.2 Retinoscopy and Refraction
- 2.3 Amblyopia Treatment Guidelines

##### Lesson 3: Ophthalmoscopy in Children

- 3.1 Direct vs Indirect Ophthalmoscopy

##### Lesson 4: Examination Under Anesthesia

##### Lesson 5: Cybersight Case Presentation

## Module One: Evaluation of the Pediatric Patient and the Adults Strabismus Patient

This module is one week in length and can be delivered as a hospital-based training program or integrated into a FEH project.

### Competencies covered in Module One:

1. Full evaluation of the pediatric patient and adult strabismus patient
2. Full evaluation of the pediatric patient under anesthesia

## One Week Course Outline:

- ✓ Structured classes on knowledge, theory and skills for full examination of the pediatric patient and the adult strabismus patient, which includes:
  - Case discussions (presentation by mentor and learner)
  - Surgical video review (both mentor and learner)
  - Reinforcement of educational content from Pre-Learning Module
- ✓ Clinical training with Orbis VF on general preoperative assessment of pediatric patients and adult strabismus patients:
  - History taking and charting
  - Examination of the pediatric patient in clinic
    - Examination of pediatric patients
    - Retinoscopy refraction
    - Indirect ophthalmoscopy
    - Measurement of basic strabismus
  - Diagnosis and treatment plans
- ✓ Workshops in:
  - Use of prisms for measuring strabismus (prism bars, loose prisms)
  - Refraction (retinoscopic, loose-lenses, phoropter)
  - Glasses prescription guidelines
  - Amblyopia treatment guidelines

## Course allocation:

- ✓ Structured Classes & Wet lab: 30% of course time
- ✓ Clinical Training: 70% of course time

Following the completion of module one, registered participants can access pre-learning Module Two educational content and training materials through Cybersight®.

## Pre Learning Module Two

Prior to the start of the second onsite training module, registered participants will access educational content and training materials through Cybersight®.

### Pre-learning materials include:

- ✓ Pre-examination for Pre-Learning Module Two
- ✓ Didactic Learning: See topics in text box
- ✓ Demonstration Videos on:
  - Sterile Techniques and OR safety (Gloving, Gowning and Scrubbing)
  - Use of surgical loupes in the operating theatre
- ✓ Glasses prescription guidelines
- ✓ Amblyopia treatment guidelines
- ✓ Pediatric Strabismus Surgical Videos: Routine Horizontal Muscle Cases
- ✓ Orbis Essential Equipment List for Pediatric Surgeries
- ✓ Post-Examination for Pre-Learning Module Two

## Module Two: Basic Strabismus

This module is one week in length and can be delivered as a hospital-based training program or integrated into a FEH project.

### Learning Topics:

#### Lesson 1: Anatomy and Physiology of Extra Ocular Muscles

- 1.1 The Extraocular Muscles
- 1.2 Physiology of Ocular Motility
- 1.3 Video Demo of Ocular Movements

#### Lesson 2: Examination and Diagnosis of Strabismus

- 2.1 Assessment and Recording Ocular Motility
- 2.2 Horizontal Strabismus
- 2.3 Pattern Strabismus
- 2.4 Clinically Testing Extraocular Muscles

#### Lesson 3: Ophthalmoscopy in Children

- 3.1 Magnification in Strabismus Surgery
- 3.2 Surgical Instruments and Sutures
- 3.3 Postoperative Care of the Patient

#### Lesson 4: Basic Strabismus Procedure

- 4.1 Limbal vs Cul-de-sac Incision
- 4.2 Horizontal Muscle Procedures
- 4.3 Muscle Transposition Procedures
- 4.4 Surgical Dose Response Table

#### Lesson 5: Cybersight Consult

### Competencies covered in Module Two:

1. Full examination of the pediatric or adult strabismus patient
2. Ability to form the differential diagnosis and treatment plan for basic types of strabismus.
3. Ability to perform basic horizontal muscle surgery including:
  - a. Esotropia (congenital, refractive with residual, nonrefractive)
  - b. Exotropia (intermittent exotropia, decompensated XT)
  - c. Up and down-shifting of horizontal rectus muscles for A- and V-patterns
  - d. Use of surgical loupes in the operating theater
4. Post-operative management of strabismus patients

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## One Week Course Outline:

- ✓ Structured classes on knowledge, theory and skills for basic strabismus, which includes:
  - Case discussions (presentation by mentor and learner)
  - Surgical video review (both mentor and learner)
  - Reinforcement of educational content from Pre-Learning Module One and Two.
- ✓ Clinical training with Orbis VF on preoperative assessment of the strabismus patient:
  - History taking and charting
  - Examination of the strabismus patient in clinic
    - Examination of pediatric patients
    - Retinoscopic refraction
    - Indirect ophthalmoscopy
    - Measurement of basic strabismus
  - Diagnosis and treatment plans
- ✓ Workshops in:
  - Use of prisms
  - Refraction
  - Glasses prescription guidelines
  - Amblyopia treatment guidelines
- ✓ Wet lab: Introduction to using surgical loupes
  - Scleral pass techniques
    - Fixed
    - Hang-back
    - Plications
- ✓ OR training in surgical treatment of basic horizontal strabismus
  - Esotropia (congenital, refractive with residual, nonrefractive).
  - Exotropia (intermittent exotropia, decompensated XT)
  - Up and down-shifting of horizontal rectus muscles for A- and V-patterns
  - Introduction to Inferior Oblique procedures
  - Using surgical loupes in the operating theatre

## Course allocation:

- ✓ Structured Classes & Wet lab: 25% of course time
- ✓ Clinical Training: 25% of course time
- ✓ OR Training: 50% of course time

Following the completion of Module Two, registered participants can access pre-learning Module Three educational content and training materials through Cybersight®.

## Pre Learning Module Three

Prior to the start of the third onsite training module, registered participants will access educational content and training materials through Cybersight®.

### Pre-learning materials include:

- ✓ Pre-examination for Pre-Learning Module Three
- ✓ Orbis Manual: Cataracts in Childhood
- ✓ Didactic Learning: See topics in text box
- ✓ Demonstration Videos on:
  - Pediatric Examination
  - Sterile Techniques and OR safety (Gloving, Gowning and Scrubbing)
  - Hand-held Keratometry
  - Use of portable A-Scan
  - Refraction in children
    - Loose Lens Retinoscopy
- ✓ Pediatric Cataract Surgical Videos: Routine Cases for children age 5 years and less (vitrector technique), and routine cases for children age over 5 years (aspiration technique)
- ✓ Orbis Essential Equipment List for Pediatric Cataract Surgery
- ✓ Post-Examination for Pre-Learning Module Three

## Module Three: Pediatric Cataract

This module is one week in length and can be delivered as a hospital-based training program or integrated into a FEH project.

### Competencies covered in Module Three:

1. Ability to perform a full examination of the pediatric cataract patient in clinic

#### Learning Topics:

Lesson 1: Classification of Pediatric Cataracts

Lesson 2: Preoperative Approach for Pediatric Cataract Surgery

- 2.1 Preoperative Routine
- 2.2 Preoperative Laboratory Evaluation
- 2.3 Preoperative Drops
- 2.4 EUA

Lesson 3: IOL Types and Calculations in Children

Lesson 4: Cataract Surgery Techniques

- 4.1 Introduction
- 4.2 Cataract Surgery Without IOL in Children 5 Years of Age and Younger: Vitrector Technique
- 4.3. Cataract Surgery with IOL and Primary Posterior Capsulotomy Via Anterior Approach in Children 5 Years of Age and Younger: Vitrector Technique
- 4.4 Cataract Surgery with IOL and Primary Capsulotomy Via Pars Plana Approach in Children 5 Years of Age and Younger: Vitrector Technique
- 4.5 Cataract Surgery with IOL in Children 5 Years of Age and Older: Irrigation/Aspiration Technique (no posterior capsulotomy or anterior vitrectomy)
- 4.6 Technical Aspects of Pediatric Cataract Surgery
- 4.7 Pediatric Cataract Surgery in Difficult Situations

Lesson 5: Postoperative Management of Pediatric Cataract Patients

- 5.1 Post op Medications
- 5.2 Postoperative Follow up
- 5.3 Refractive Management
- 5.4 Amblyopia Management
- 5.5 Secondary Opacification of the Visual Axis
- 5.6 Secondary IOL implantation
- 5.7 Long-Term Follow up

2. Ability to form the differential diagnosis and treatment plan for pediatric cataract cases.
3. Ability to perform an examination of the pediatric cataract patient under anesthesia.
4. Describe and apply the principles, indications for, mechanics of, and performance of IOL calculation for pediatric patients, including the calculation of post-operative IOL target refractive errors.
5. Independently perform routine pediatric cataract surgery.
6. Manage intraoperative and postoperative complications of pediatric cataract surgery.
7. Post-operative management of pediatric cataract patients, including complete postoperative examinations and refraction.

## Two Week Course Outline:

- ✓ Structured classes on knowledge, theory and skills for pediatric cataract, which includes:
  - Case discussions (presentation by mentor and learner)
  - Surgical video review (both mentor and learner)
  - Reinforcement of educational content from Pre-Learning Module One and Three
- ✓ Clinical training with Orbis VF on preoperative assessment of pediatric cataract patients:
  - History taking and charting
  - Examination of the pediatric cataract patient in clinic
  - Role of laboratory testing in pediatric cataract patients
  - Diagnosis and treatment plans
- ✓ Workshop training in:
  - Hand-held keratometry
  - Refraction and spectacle correction
  - Retinoscopy
  - A-scan biometry and IOL calculation
  - Indirect ophthalmoscopy
- ✓ OR Training in examination of the pediatric cataract patient under anesthesia including:
  - Measuring IOP
  - Keratometry
  - Retinoscopy
  - Horizontal corneal diameter measurement
  - Evaluation of anterior chamber structure and depth
  - Evaluation of lens and ciliary body
  - Evaluation of retina and optic nerve using both direct and indirect ophthalmoscope
  - Intraocular lens calculation
    - Postoperative IOL Target Refractive Errors
- ✓ OR training in surgical management of pediatric cataracts:

- Management of the anterior capsule
  - Vitrectorhexis technique for children age 5 years and less.
  - Manual tear technique for children age 3 years and up.
  - Emphasis on managing elastic capsules in young children.
- Management of the posterior capsule
  - Primary posterior capsulotomy in children age 5 years and less.
    - Manual tear technique without vitrectomy
    - Vitrector technique (requires vitrector)
      - Anterior approach prior to IOL insertion
      - Anterior approach after IOL insertion
      - Pars plana approach after IOL insertion

### Course allocation:

- ✓ Structured Classes & Wet lab: 25% of course time
- ✓ Clinical Training: 25% of course time
- ✓ OR Training: 50% of course time

Following the completion of Module Three, registered participants can access pre-learning Module Four educational content and training materials through Cybersight®.

## Pre Learning Module Four

Prior to the start of the fourth onsite training module, registered participants will access educational content and training materials through Cybersight®.

Pre-learning materials include:

- ✓ Pre-examination for Pre-Learning Module Four
- ✓ Didactic Learning: See topics in text box
- ✓ Demonstration Videos on:
  - Sterile Techniques and OR safety (Gloving, Gowning and Scrubbing)
  - Use of surgical loupes in the operating theatre
- ✓ Glasses prescription guidelines
- ✓ Amblyopia treatment guidelines
- ✓ Pediatric Strabismus Surgical Videos: Advanced Cases
- ✓ Orbis Essential Equipment List for Pediatric Surgery
- ✓ Post-Examination for Pre-Learning Module Four

## Module Four: Advanced Strabismus

This module is one week in length and can be delivered as a hospital-based training program or integrated into a FEH project.

Competencies covered in Module Four:

### Learning Topics:

Lesson 1: Pattern Strabismus and Dissociated Strabismus

- 1.1 Pattern Strabismus and Oblique Muscle Dysfunction
- 1.2 Dissociated Strabismus

Lesson 2 Surgery of the Inferior Oblique

- 2.1 Inferior Oblique Myectomy
- 2.2 Inferior Oblique Recession
- 2.3 Inferior Oblique Anterior Transposition

Lesson 3: Evaluation and Surgical Management of the Superior Oblique

- 3.1 Evaluation of the Superior Oblique Palsies
- 3.2 Brown Syndrome
- 3.3 Superior Oblique Traction Testing (SOP and Brown Syndrome)
- 3.4 Surgical Procedures of the Superior Oblique

Lesson 4: Duane Syndrome

Lesson 5: Restrictive Strabismus

- 5.1 Introduction to Restrictive Strabismus
- 5.2 Thyroid Myopathy (Grave's)
- 5.3 Fibrosis Syndrome
- 5.4 Strabismus after Scleral Buckle or Tube Shunt Surgeries

Lesson 6: Third Nerve Palsy

Lesson 7: Sixth Nerve Palsy

Lesson 8: Use of Botox in Strabismus

- 8.1 Introduction to Botox in Strabismus
- 8.2 Sixth Nerve Palsy
- 8.3 Infantile Esotropia

Lesson 9: Basic Adjustable Suture Surgery

1. Full examination and strabismus measurements of the complex strabismus patient
2. Ability to form the differential diagnosis and treatment plan for the complex strabismus patient
3. Ability to perform vertical muscle and complex strabismus surgery
4. Post-operative management of strabismus patients

## One Week Course Outline:

- ✓ Structured classes on knowledge, theory and skills for complex strabismus, which includes:
  - Case discussions (presentation by mentor and learner)
  - Surgical video review (both mentor and learner)
  - Reinforcement of educational content from Pre-Learning Module One and Four
- ✓ Clinical training with Orbis VF on preoperative assessment of pediatric patients with complex strabismus conditions including:
  - Evaluation, measurement, and management of vertical strabismus, restrictive strabismus, Duane syndrome, nystagmus syndromes, and cranial nerve palsies (CN 3, 4, 6 with associated strabismus syndromes) in children and adults.
    - Prism measurement of simultaneous horizontal and vertical deviations.
    - Three-step test for cyclo-vertical muscles (Superior Oblique palsies)
    - Double-Maddox rod testing for torsion
    - Assessment of anomalous head postures
  - Botox injections for strabismus (***\*if Botox is routinely available***)
- ✓ OR training in surgical management of complex strabismus:
  - Horizontal muscle surgery using small fornix incisions
  - Reoperations
    - Slipped/lost medial rectus muscles
  - Superior and Inferior Rectus muscle surgery
    - Recess/resect
  - Inferior Oblique surgery
    - Recess/myectomy/anterior transposition
  - Superior Oblique surgery
    - Tenotomy/spacer/tuck
  - Posterior fixation sutures
    - High AC-A ratios/augmented transpositions
  - Transposition procedures
    - Split-tendon/full-tendon/Foster augmentation
  - Thyroid ophthalmopathy and other restrictive forms of strabismus (fibrosis syndrome, post-traumatic).

## Course allocation:

- 
- ✓ Structured Classes & Wet lab: 25% of course time
  - ✓ Clinical Training: 25% of course time
  - ✓ OR Training: 50% of course time

Following the completion of Module Four, registered participants can access pre-learning Module Five educational content and training materials through Cybersight®.

## Pre Learning Module Five

Prior to the start of the fifth onsite training module, registered participants will access educational content and training materials through Cybersight®.

Pre-learning materials include:

- ✓ Pre-examination for Pre-Learning Module Five
- ✓ Orbis Manual: **Pediatric Glaucoma**
- ✓ Didactic Learning: See topics in text box
- ✓ Demonstration Videos on:
  - Sterile Techniques and OR safety (Gloving, Gowning and Scrubbing)
  - Tonopen or iCare Pro availability preferred.
  - Gonioscopy lens use (Koeppel or Goldmann)
- ✓ Pediatric Glaucoma Surgical Videos
- ✓ Orbis Essential Equipment List for Pediatric Glaucoma Surgery
- ✓ Post-Examination for Pre-Learning Module Five

### Learning Topics:

Lesson 1: Childhood Glaucoma

- 1.1 Causes
- 1.2 Classification
- 1.3 Signs, Age of Onset and Prognosis

Lesson 2: Infantile Primary "Congenital" Glaucoma

- 2.1 Signs and Symptoms of Primary Congenital Glaucoma

Lesson 3: Glaucoma Associated with a Syndrome and a Secondary Pediatric Glaucoma

- 3.1 Glaucoma Associated with a Syndrome
- 3.2 Secondary Pediatric Glaucoma

Lesson 4. (EUA) Examination Under Anesthesia

Lesson 5. Medical Treatment of Pediatric Glaucoma

Lesson 6. Surgical Management of Pediatric Glaucoma

- 6.1 Goniotomy
- 6.2 Trabeculotomy
- 6.3 Trabeculectomy
- 6.4 Tube-Shunt Implants
- 6.5 Cyclodestruction/Cycloablation

## Module Five: Pediatric Glaucoma

This module is one week in length and can be delivered as a hospital-based training program or integrated into a FEH project.

Competencies covered in Module Five:

1. Full examination of the pediatric glaucoma patient both in clinic and under anesthesia.
2. Ability to form the differential diagnosis and treatment plan for the pediatric glaucoma patient.
3. Independently perform pediatric glaucoma surgery, particularly trabeculotomy and tube shunt surgery (**\*if tube shunts are available**).
4. Post-operative management of pediatric glaucoma patients.

## One Week Course Outline:

- ✓ Structured classes on knowledge, theory and skills for pediatric glaucoma, which includes:
  - Case discussions (presentation by mentor and learner)
  - Surgical video review (both mentor and learner)
  - Reinforcement of educational content from Pre-Learning Modules One and Five
- ✓ Clinical training with Orbis VF on preoperative assessment of pediatric glaucoma patients including:
  - Clinical Examination of the pediatric glaucoma patient
  - Diagnosis and treatment plan
- ✓ OR training in examination of the pediatric glaucoma patient under anesthesia:
  - Examination under anesthesia protocol
  - Tonopen or iCare Pro availability preferred.
  - Gonioscopy lens use (Koeppel or Goldmann)
- ✓ OR training in surgical management of pediatric glaucoma:
  - Trabeculotomy technique
  - Goniotomy technique
  - Tube-shunt implantation technique (for refractory congenital glaucoma cases and secondary aphakic/pseudophakic glaucoma after surgery for pediatric cataracts)

## Course allocation:

- ✓ Structured Classes & Wet lab: 25% of course time
- ✓ Clinical Training: 25% of course time
- ✓ OR Training: 50% of course time

Following the completion of Module Five, registered participants can access post learning and mentorship through Cybersight®.

## Pre Learning Module Six

Prior to the start of the sixth onsite training module, registered participants will access educational content and training materials through Cybersight®.

Pre-learning materials include:

- ✓ Pre-examination for Pre-Learning Module Six
- ✓ Didactic Learning: See topics in text box
- ✓ Videos on:
  - Ultrasound
  - Pathology of RB
  - Cryotherapy
  - Consolidation Therapy
- ✓ Post-Examination for Pre-Learning Module Six

### Learning Topics:

- Definitions and Statistics
- Presentation of Retinoblastoma
- Differential Diagnosis
- Examination
- Diagnosis
- Classification
- Genetics
- Treatment

## Module Six: Retinoblastoma

This module is one week in length and can be delivered as a hospital-based training program or integrated into a FEH project.

Competencies covered in Module Six:

1. Evaluation, staging and selection of appropriate treatment options for new RB patients
2. Proficiency in performing enucleation
3. Proficiency in performing cryotherapy
4. Proficiency in performing local laser therapy
5. Knowledge of systemic and intra-arterial chemotherapy

One Week Course Outline:

- ✓ Structured classes on knowledge, theory and skills for retinoblastoma, which includes:
  - Case discussions (presentation by mentor and learner)
  - Surgical video review (both mentor and learner)
  - Reinforcement of educational content from Pre-Learning Modules Six
  - Awareness of Systemic Chemotherapy
    - Requires access to a cooperating hematology/oncology service
  - Awareness of Intra-arterial chemotherapy applications

- ✓ Clinical training with Orbis VF on preoperative assessment of the retinoblastoma patient including:
  - Evaluation, staging and selection of appropriate treatment options for new retinoblastoma patients. *Requires a RetCam or similar imaging device to partner with a more experienced retinoblastoma treatment center.*
- ✓ OR training in ophthalmic surgical management of retinoblastoma glaucoma:
  - Enucleation
    - Appropriate patient selection and surgical technique.
    - Orbital reconstruction techniques. Requires access to orbital implants, possibly eye banked sclera.
      - Orbital implant
      - Dermis fat graft technique if implants not available
  - Cryotherapy
    - Requires a cryotherapy unit and pediatric sized tips.
  - Local Laser Therapy
    - Requires access to a portable green (preferred) or red diode laser

### Course allocation:

- |                      |                    |
|----------------------|--------------------|
| ✓ Structured Classes | 50% of course time |
| ✓ Clinical Training: | 25% of course time |
| ✓ OR Training:       | 25% of course time |

Following the completion of Module Six, registered participants can access post learning and mentorship through Cybersight®.

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## Post Learning & Follow Up

For three months following the course completion, registered participants will continue to receive mentorship from Orbis Volunteer Faculty through Cybersight®.

### Continued mentorship includes:

- ✓ Cybersight® Consult: Connects participants to the mentors who conducted the onsite training. Participants upload monthly cases and benefit from consultation and case discussion with the course mentors. This allows them to continue to receive guidance and skill development from the mentors for an additional three months as they increase their surgical volume and clinic work. eConsult is currently available in several international languages.
- ✓ Cybersight® Learn: All the course material will remain available to participants, so they can continue to reference them as they develop their practice.

### Post-course follow-up includes:

- ✓ Participants will be obliged to upload 4 cases per month to eConsult for three months post training. The mentors rank all consult cases for quality. This data will be monitored to track the participant's progress.
- ✓ Participants will submit a surgical log (this log will be provided to participants) once they have completed 20 surgical cases post training (with at least 5 cases each of basic strabismus, complex strabismus, pediatric glaucoma and pediatric cataract). This will be reviewed by the mentor and also tracked for monitoring purposes.
- ✓ Certificate of completion distributed to all participants that complete the full course, including:
  - Completion of all five pre-learning modules
  - Passing all five pre-learning post course examinations
  - Completion of all five onsite modules and competency sign off by Orbis VF Mentor
  - Meeting the post course deliverables
    - Monthly upload of cases to Cybersight (12 in total)
    - Upload of surgical log

# APPENDIX A:

## Recommended Donations by Module

### Module One: Evaluation of the Pediatric Patient and the Adult Strabismus Patient

- ✓ American Academy of Ophthalmology: Basic Clinical and Science Course Series
- ✓ Prism set
- ✓ Pediatric trial frame and lenses
- ✓ Retinoscope
- ✓ Fixation devices

### Module Two: Basic Strabismus

- ✓ Adjustable loupes with LED illumination attachment
- ✓ Basic strabismus surgical instrument set
- ✓ Mayo stand set-up/placement: Most facilities would benefit from a Mayo stand that places the instruments over the patient's chest rather than on a table to the side of the surgeon. Requires a Mayo stand with flat feet that will pass underneath the bed

### Course Three: Pediatric Cataract

- ✓ Requires hand-held keratometer for young children
- ✓ Requires portable A-scan for measurements in operating theatre.
- ✓ Requires availability of an automated vitrector (such as the Alcon Accurus or Constellation) or an anterior segment machine with vitrectomy capabilities (such as the Alcon Laureate).

### Course Four: Advanced Strabismus

- ✓ Requires availability or donation of a full strabismus surgical instrument set

### Course Five: Pediatric Glaucoma

- ✓ Requires availability or donation of left and right trabeculotomes
- ✓ Requires availability or donation of both right- and left- handed Swan-Jacob (or similar) surgical gonioscopy lenses.
- ✓ Requires sustained availability of consumable tube-shunts (Ahmed or Baerveldt).

### Course Six: Retinoblastoma

- ✓ Flynn scleral depressor and eyelid speculum set
- ✓ B-scan ultrasound unit
- ✓ Cryotherapy unit with small cryo-probe tip
- ✓ Indirect ophthalmoscope
- ✓ Indirect ophthalmoscopy lenses (laser safe) in 20 D, 2.2 D, and 28 or 30 D
- ✓ Enucleation scissors

- ✓ Orbital implants that do not require donor sclera (eye banks are hard to come by in developing countries)
- ✓ 810 nm diode laser unit
- ✓ RetCam or similar portable fundus imaging system that can be used in the operating room.