

ព្រះរាជាណាចក្រកម្ពុជា
ជាតិ សាសនា ព្រះមហាក្សត្រ



សាកលវិទ្យាល័យវិទ្យាសាស្ត្រសុខាភិបាល
មហាវិទ្យាល័យវេជ្ជសាស្ត្រ



ក្រសួងសុខាភិបាល

កម្មវិធីសិក្សា
ជ្រក់វេជ្ជបណ្ឌិតឯកទេស
បក្ខុរោគវិទ្យា

ឆ្នាំ ២០១៤

អានប្រកាស

យោងតាមផែនការយុទ្ធសាស្ត្ររបស់ក្រសួងសុខាភិបាល ២០០៨-២០១៥ ការពង្រឹងប្រព័ន្ធបណ្តុះបណ្តាលមុនពេលបំរើសេវា ការបណ្តុះបណ្តាលក្រោយមូលដ្ឋាន និងការបណ្តុះបណ្តាលក្នុងពេលបំពេញការងារអោយមានគុណភាពគឺជាអាទិភាពចម្បង ។

ជាមួយគ្នានេះដែរ ដើម្បីឆ្លើយតបនឹងខ្លឹមសារអនុក្រឹត្យលេខ២១ អនក្រ.បក ចុះថ្ងៃទី១៣ ខែមីនា ឆ្នាំ២០០៧ ស្តីពីការបណ្តុះបណ្តាលក្នុងវិស័យសុខាភិបាល កម្មវិធីសិក្សាថ្នាក់ឯកទេសត្រូវបានបង្កើតឡើងដើម្បីបំពេញតម្រូវការសុខភាពរបស់ប្រជាជនកម្ពុជា ។

ការពិនិត្យកែសម្រួល និងធ្វើបច្ចុប្បន្នភាពកម្មវិធីសិក្សាជាទៀងទាត់គឺជាការចាំបាច់ដើម្បីលើកកម្ពស់គុណភាពបណ្តុះបណ្តាលឱ្យកាន់តែល្អប្រសើរទៅតាមគោលការណ៍របស់រាជរដ្ឋាភិបាល និងស្របតាមការវិវឌ្ឍន៍របស់ពិភពលោក ។

ក្រសួងសុខាភិបាលសូមថ្លែងអំណរគុណជាពិសេសដល់សាកលវិទ្យាល័យវិទ្យាសាស្ត្រសុខាភិបាលសាស្ត្រាចារ្យ គ្រូបង្រៀន ដែលបានខិតខំរៀបចំចងក្រង និងធ្វើបច្ចុប្បន្នភាពកម្មវិធីសិក្សាថ្នាក់ **ឯកទេសចក្ខុរោគវិទ្យា** និងសូមថ្លែងអំណរគុណចំពោះការជួយជ្រោមជ្រែងផ្នែកបច្ចេកទេសពីសហប្រតិបត្តិការបារាំង ។

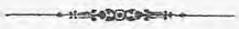
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រាជធានីភ្នំពេញ ថ្ងៃទី១៧ ខែតុលា ឆ្នាំ ២០១៤

រដ្ឋមន្ត្រីក្រសួងសុខាភិបាល ៥



សេចក្តីថ្លែងអំណរគុណ



សាកលវិទ្យាល័យវិទ្យាសាស្ត្រសុខាភិបាល សូមថ្លែងអំណរគុណយ៉ាងជ្រាលជ្រៅចំពោះគណៈកម្មការរៀបរៀងកម្មវិធីសិក្សាវេជ្ជសាស្ត្រកម្រិតឯកទេស សម្រាប់ប្រើប្រាស់នៅមហាវិទ្យាល័យវេជ្ជសាស្ត្រ នៃសាកលវិទ្យាល័យវិទ្យាសាស្ត្រសុខាភិបាល ក្នុងការបណ្តុះបណ្តាលនិស្សិតបន្ថែមពីថ្នាក់បរិញ្ញាប័ត្រវិទ្យាសាស្ត្រវេជ្ជសាស្ត្រ ឬថ្នាក់វេជ្ជបណ្ឌិតទូទៅ ។

សូមថ្លែងនូវការកោតសរសើរផងដែរចំពោះគណៈកម្មការនេះដែលបានខិតខំយកអស់កម្លាំងកាយចំណេះដឹង ប្រាជ្ញា ចូលរួមអភិវឌ្ឍន៍ការបណ្តុះបណ្តាលវេជ្ជបណ្ឌិតនៅមហាវិទ្យាល័យវេជ្ជសាស្ត្រ នៃសាកលវិទ្យាល័យវិទ្យាសាស្ត្រសុខាភិបាល ឲ្យមានចំណេះដឹង ជំនាញ និង សីលធម៌ឆ្លើយតបនឹងតម្រូវការរបស់សេវាសុខាភិបាលក្នុងប្រទេសកម្ពុជាក្នុងតំបន់។

គណៈកម្មការរៀបរៀងកម្មវិធីសិក្សាក្រោយឧត្តមសិក្សា កម្រិតវេជ្ជបណ្ឌិតឯកទេសបច្ចុប្បន្នមានសមាសភាពដូច ខាងក្រោមនេះ ៖

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| ៤-លោកសាស្ត្រាចារ្យជំនួយ | ដោះ | សីហា |
| ៥-លោកសាស្ត្រាចារ្យជំនួយ | ម៉ា | អមរិន្ទ |
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| ៧-លោកសាស្ត្រាចារ្យជំនួយ | យ៉ោក | ធន |
| ៨-លោកសាស្ត្រាចារ្យ | សៀង | ថារិន្ទ |
| ៩-លោកសាស្ត្រាចារ្យជំនួយ | ប៊ុនចាន់ | យុត្តិរុទ្ធ |
| ១០-ទីប្រឹក្សាបច្ចេកទេស | | RANZCO |

រាជធានីភ្នំពេញ ថ្ងៃទី ០៤ ខែកញ្ញា ឆ្នាំ ២០១៤

សេចក្តីថ្លែងអំណរគុណ ៥



សាស្ត្រាចារ្យ.សាវ័ន វឌ្ឍនៈ

**KINGDOM OF CAMBODIA
NATION RELIGION KING**



UNIVERSITY OF HEALTH SCIENCES



MINISTRY OF HEALTH

***OPHTHALMOLOGY
RESIDENCY TRAINING
CURRICULUM***

2014

OPHTHALMOLOGY RESIDENCY TRAINING CURRICULUM CONTENTS

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BACKGROUND

The Ophthalmology Residency Training (ORT) curriculum is the single core curriculum underpinning all stages of learning benchmarked against the International Council of Ophthalmologists (ICO) curriculum and customized for the Cambodian context.

The curriculum is a central reference document which trainees will use throughout the continuum of their training. Their interaction with the curriculum document at each stage of learning will be informed by the assessment requirements as they progress.

Specific learning outcomes are outlined in each section of the revised curriculum, and a star rating system has been used to prioritise, classify and contextualize learning:

- ** Trainees must have a comprehensive knowledge of and be able to manage autonomously this learning outcome at the end of training
- * Trainees must have assisted with or have a good practical knowledge of this learning outcome at the end of training

Unstarred Trainees must have a reasonable knowledge and understanding of this learning outcome, but not necessarily be expected to perform autonomously.

The goal of the ORT Program is to produce an ophthalmologist who, on completion of training, is equipped to undertake safe, unsupervised, comprehensive, general ophthalmology practice. The key objectives of ophthalmic education are to reduce blindness, improve access to and quality of eye care, standardise skills, and to foster continued improvement. Trainees completing the program will gain skills to critically understand concepts, intelligently apply understanding, and implement independent thought.

The development of the revised curriculum is one outcome of the first review of the ORT curriculum. This review was conducted in 2013-2014 by the Cambodian Ministry of Health (MoH), University of Health Sciences (UHS), the Cambodian Ophthalmological Society (COS) and The Royal Australian and New Zealand College of Ophthalmologists (RANZCO). The review was supported by funding from the Australian Department of Foreign Affairs and Trade (DFAT).

The review and customisation process for the ORT curriculum included the following steps:

- RANZCO conducted a scoping visit from 8th-12th April 2013 to improve understanding of the curriculum revision needs of the ORT program and plan the review with key stakeholders, including UHS, NPEH, COS the ORT Program Technical Committee (ORT TC), Residents and teaching hospitals.
- In May 2013, the Cambodian ORT TC undertook a desk review of the then current curriculum and provided their recommendations to RANZCO. A volunteer working group of RANZCO Fellows with experience in curriculum development and ophthalmology in Cambodia then reviewed the curriculum and made additional recommendations.
- The revised version of the curriculum was used as the base document at the Curriculum Review Workshop held in Phnom Penh on 9th – 10th June 2013.
- Comments and revisions were collated into a master curriculum document, and circulated to all members of the RANZCO and ORT TC review groups for their final review and feedback.

- The International Council of Ophthalmology (ICO) reviewed the refined curriculum and made recommendations.
- The curriculum was finalised following a Curriculum and Assessment workshop held in April 2014 and drafts were sent to the University of Health Sciences and relevant stakeholders for incorporation into the ORT program outline and endorsement.

DURATION OF STUDY

Normative full time study of "Ophthalmology Residency Training is three years.

ADMISSION REQUIREMENTS

The number of students admitted each year to enroll in specialized degree is determined by the Ministry of Health.

For entry requirements, the applicant must have:

1. Bachelor of Medical Sciences or a GP. recognized by the competent authorities in Cambodia Medical Sciences; and
2. Pass the recruitment examination organized by University of Health Sciences of Cambodia (UHS); and
3. Foreign languages: French and English (speaking, reading, listening, writing) ; and
4. Taken the annual registration with the administrative services of UHS.

COURSE STRUCTURE

This diploma program structure and content are designed to develop explicit theory-practice-research links. It is split between academic study, clinical experience, research and private study, which equips practitioners the knowledge and skills to work with clients across the lifespan, ranging from children to older adults, in a variety of settings and contexts. The three domains are organized as follow:

Year	Theory		Clinical Training				Scientific Training (Seminars & Thesis)		Total	
			Clinical Practice		Clinical Seminar		Hours	Credits		
	Hours	Credits	Hours	Credits	Hours	Credits			Hours	Credits
1	130	9	1450	32	96	3	30	1	1706	45
2	130	9	1450	32	96	3	30	1	1706	45
3	130	9	1450	32	96	3	30	1+12 (Thesis)	1706	57
Total	390	27	4350	96	288	9	90	15	5118	146

Note:

- 15 hours of Theory = 1 Credit
- 30 hours of Clinical Seminar and Researches = 1 Credit
- 45 hours of Clinical Practice = 1 Credit

GENERAL MEDICINE AND FUNDAMENTALS OF OPHTHALMOLOGY

Ophthalmologists are physicians first, and must be able to recognize, deal with (especially in the case of medical emergencies), and understand the implications for ophthalmic conditions of commonly occurring diseases.

All the learning outcomes listed in this section are considered essential to the practice of ophthalmology and attract a 'two star' - ** - rating. The star rating system has therefore not been assigned to each individual item in this section of the curriculum.

Learning outcomes

By the end of the course, residents should be able to demonstrate an understanding of the conditions listed below.

Medical emergencies

1. Recognize and manage syncope (fainting)
2. Recognize and manage symptomatic hypoglycaemia
3. Recognize and manage angina pectoris
4. Recognize and manage cardiopulmonary arrest
5. Shock:
 - Outline the classification and mechanisms of shock
 - Describe the assessment of a patient in shock
 - Outline the principle of treatment of shock
 - Define anaphylactic shock
 - Describe the treatment of anaphylaxis
6. Outline the management of seizures and status epilepticus
7. Recognise and manage toxic reactions to local anaesthetics

Cardiovascular disease

1. Describe the diagnosis and management of hypertension
2. Describe the diagnosis and management of acquired heart disease
3. Describe the diagnosis and management of hypercholesterolaemia

Cerebrovascular disease

1. Describe the presentation and management of cerebral ischemia
2. Describe the presentation and management of carotid occlusive disease
3. Describe the presentation and management of intracranial haemorrhage

Diabetes mellitus

1. Describe the definition and classification of diabetes mellitus
2. Describe the clinical presentation of diabetes
3. Outline the diagnostic criteria and screening recommendations for diabetes
4. Outline the principles of management of diabetes, including diet and exercise, oral agents and insulin therapy
5. List the medications used in the treatment of diabetes
6. Understand the long-term complications of diabetes, their prevention and treatment, in particular the importance of good glycaemic control in the prevention of diabetic complications in the eye

Thyroid disease

1. Describe the clinical diagnosis of thyroid disease, including hyperthyroidism, hypothyroidism, thyroiditis and thyroid tumors
2. Describe testing for thyroid disease
3. Outline the basic principles of management of thyroid disease

Perioperative Management in Ocular Surgery

1. Perform pre-operative assessments for patients undergoing ocular surgery by taking a comprehensive history and performing a clinical examination
2. Manage co-existing medical conditions in patients undergoing surgery, including instructions regarding continuation or discontinuation of regular medications such as anti-coagulants, anti-hypertensives and diabetic medications
3. Identify and manage additional potential risks to the patient in the perioperative period

References**Essential reading**

1. American Academy of Ophthalmology Basic Clinical Science Course: Section 1: Update on General Medicine

Additional reading

2. Oxford Handbook of Clinical Medicine: Murray Longmore, Ian Wilkinson, Edward Davidson, Alexander Foulkes. Oxford Medical Handbooks 8th Edition 2010

OPTICS AND REFRACTION

Ophthalmology is a visual discipline. Uncorrected refractive error remains the leading cause of visual impairment worldwide and an important cause in Cambodia. A thorough understanding of the principles of clinical optics and refraction is essential for an ophthalmologist.

The general educational objectives of this section are to understand the principles, concepts, instruments, and methods of ophthalmology-related optics and refraction; and to apply these to clinical practice.

Learning Objectives

At the end of the course, residents should be able to:

- describe principles of optics affecting vision and correction of refractive errors
- recognise the types of corrective lens (spectacle and contact lens)
- perform retinoscopy, keratometry, and autorefractometry
- prescribe eye glasses and contact lenses
- discuss prescription of eye glasses and contact lens fitting techniques
- evaluate and manage the subnormal vision patients
- recognize principles and features of surgical correction of refractive errors
- describe principles of ophthalmic instruments
- identify the common vision aids used to assist patients with low vision
- understand the principles of biometry in cataract surgery
- calculate and select an appropriate IOL power for patients undergoing cataract surgery
- understand anisometropia and measures to avoid/ manage this in patients undergoing cataract surgery

Physical Optics

1. Describe the wave and particle nature of light **
2. Explain the concepts of interference and coherence *
3. Define optical resolution *
4. Explain polarization *
5. Explain light scattering *
6. Define and compare transmission and absorption *
7. Define illumination *
8. Describe image quality *

Geometric Optics

Reflection (Mirrors)

1. List the laws of reflection *
2. Illustrate reflection at a plane surface (i.e., image and field of a plane mirror) *
3. Illustrate reflection at curved surfaces (i.e., focal point and focal length of a spherical mirror)*

Refraction

1. Explain the law of refraction (Snell law), including:
 - a. passage of light from one medium to another **
 - b. absolute index of refraction **
 - c. total internal reflection **
2. Explain critical angle and total internal reflection **
3. Define refractive index **

4. Illustrate refraction at a plane surface **
5. Illustrate refraction at curved surfaces **
3. Demonstrate image jump and displacement *
4. Demonstrate a multiple lens system *

Prisms

1. Define a prism **
2. Explain the notation of prisms (e.g., prism diopters) **
3. Describe the use of prisms in ophthalmology (i.e., diagnostic and therapeutic use) **
4. Describe Fresnel and similar prisms *
5. Explain the prismatic effect of lenses **
6. Define spherical decentration and prism power **
7. Illustrate refraction of light through a prism **

Spherical Lenses

1. Define a spherical lens **
2. Describe the cardinal points
3. Define vergence of light, including diopter, convergence, divergence, and vergence formula **
4. Define the terms concave and convex **
5. Define the term magnification, including: linear, angular, relative size, electronic *
6. Draw a labelled diagram that illustrates the formation of the image **

Astigmatic Lenses

1. Describe cylindrical lenses, including:
 - a. spherocylinder lenses and surfaces **
 - b. cross cylinders (e.g., Jackson cross cylinder) **
2. Describe toric lenses **
3. Demonstrate how the Maddox rod works **

Notation of Lenses

1. Design myopic, hyperopic, and astigmatic lenses **
2. Perform simple transposition **
3. Perform toric transposition **
4. Calculate a lens prescription **

Aberration of Lenses

1. Correct aberrations relevant to the eye, including spherical, coma, astigmatism, and distortion
2. Describe color aberrations and perform the duochrome test **

Clinical Optics

1. Define emmetropia **
2. Define ametropia **
3. Define myopia **
4. Define and classify hypermetropia (hyperopia) **
5. Define astigmatism **
6. Define presbyopia **
7. Define anisometropia **
8. Define aniseikonia **
9. Define aphakia **
10. Explain optical parameters affecting retinal image size **
11. Define visual acuity, including:

- a. distance and near acuity measurement **
- b. minimal acuity (i.e., visible, perceptible, separable, legible) **
- c. visual acuity charts **
12. Explain how accommodation is affected by age **
13. Explain how the pinhole effect impacts visual acuity **
14. Describe the potential problems with aphakic spectacles **
15. Describe the effect of spectacles and contact lens correction on accommodation and convergence (i.e., amplitude, near point, far point) **
16. Explain the principles of contrast sensitivity measurements
17. Describe the correction of ametropia, including:
 - a. general principles **
 - b. spectacle lenses **
 - c. contact lenses *
 - d. intraocular lenses **
 - e. principles of refractive surgery
18. Demonstrate the calculation of intraocular lens power **
19. Describe convergence or accommodative insufficiency or excess *
20. Define accommodative-convergence over accommodation (AC/A) ratio *

Clinical Refraction

Objective Refraction: Retinoscopy

1. List the principles and indications for retinoscopy **
2. Perform the technique of retinoscopy **
3. Perform an integrated refraction based upon retinoscopic results **
4. Perform cycloplegia **
5. Describe medication concentrations indicated, according to age (e.g., cyclopentolate, atropine) **
6. Prescribe refractive correction based on the obtained objective and subjective measurements **

Subjective Refraction Techniques

1. Describe the indications for and the use of trial lenses for simple refractive error **
2. Perform refraction techniques for myopia, hyperopia, and near-vision add **
3. Perform techniques for the correction of presbyopia (i.e., measuring for near adds) **
4. Perform more advanced refraction techniques (e.g., astigmatism, complex refractions, asymmetric accommodative add)**
5. Perform objective and subjective refraction techniques for more complex refractive errors, including astigmatism, irregular astigmatism (e.g., keratoconus, keratectasia, post-corneal graft), and postoperative refractive error*
6. Demonstrate the measurement of interpupillary distance (IPD) **
7. Demonstrate the prescribing of multifocal lenses *
8. Demonstrate the prescribing of lenses for children **
9. Describe binocular balance *
10. Demonstrate binocular balancing

Spectacles

11. Describe the principles underlying progressive spectacle lens design *
12. Describe progressive lenses measurements *
13. Describe spectacle prescription in children **

Instruments and Tests

1. Demonstrate use of slitlamp biomicroscope and view the fundus using 78D and 90D lenses**
2. Demonstrate the use of the indirect ophthalmoscope **
3. Demonstrate the use of the direct ophthalmoscope **
4. Demonstrate the use of the lensometer **
5. Demonstrate the use of the automated refractor *
6. Demonstrate the use of stereoacuity testing *
7. Demonstrate the use of corneal topography (e.g., placido disc **, keratometer **, automated corneal topography)
8. List indications for and use of intraocular lens (IOL) calculation algorithms **
9. List indications for the use of corneal pachymetry **
10. List indications for the use of corneal tomography with anterior segment optical coherence tomography (OCT)
11. List indications for the use of topographic/elevation corneal evaluation (i.e., Pentacam, Orbscan II, Galilei)

References

Essential reading

1. American Academy of Ophthalmology Basic Clinical Science Course: Section 3: Clinical Optics
2. Elkington AR, Frank HJ and Greaney MJ (1999) *Clinical Optics* Third Edition, Oxford: Blackwell Scientific Publications

Additional reading

1. Hunter GH and West CE (1996) *Last Minute Optics: a Concise Review of Optics, Refraction and Contact Lenses*, SLACK Inc.
2. Freeman M.H (1990) *Optics* Tenth Edition, London: Butterworths.

CATARACT AND LENS

Cataract remains the leading cause of blindness in the world and in Cambodia. The National Strategic Plan for Blindness Prevention and Control has listed as one of its primary goals the reduction of cataract blindness in Cambodia. A thorough understanding of the basic and clinical science of the lens is essential for an ophthalmologist as a large proportion of clinical practice is devoted to the management of cataract.

Learning Objectives

At the end of the course, residents should be able to:

- describe lens anatomy
- describe lens physiology and accommodation
- describe pathologies of the lens, including those of congenital and acquired cataracts
- describe the instruments used in the diagnosis of cataracts and demonstrate competence in their use
- describe the association of cataracts with aging, trauma, medications, and systemic and ocular diseases
- describe the evaluation and management of patients with cataract or other lens abnormalities, including the importance of thorough pre-operative examination to detect co-morbidities which can affect the safety and visual outcome of surgery
- state the principles of cataract surgery techniques and associated surgical technology
- design an appropriate differential diagnosis and management plan for intraoperative and postoperative complications of cataract surgery
- understand the principle of management of post-operative refractive state, including prevention and management of anisometropia

Basic Science

1. Describe the lens anatomy
2. Describe lens physiology and accommodation **
3. Identify and describe the principles and mechanisms of the following instruments in the evaluation of cataract:
 - a. retinoscope **
 - b. slit-lamp biomicroscope **
 - c. autorefractor **
 - d. phoropter or loose lenses **
 - e. keratometer **
 - f. A-scan biometer **
 - g. lensometer *
4. Describe the following:
 - a. basic ophthalmic optics as related to cataract **
 - b. types of refractive error in cataract **
 - c. retinoscopy techniques for cataract **
5. Describe the use of A-scan and B-scan contact and immersion ultrasonography and optical coherence techniques in cataract surgery to measure axial eye length and to evaluate the potential for unseen posterior pole pathology in all cases of dense cataract**

Clinical Science

Background knowledge

1. Identify the most common causes and types of cataract (e.g., cortical, nuclear sclerotic, posterior subcapsular, mature lens such as the Morgagnian cataract) **
2. Describe the relationship between the lens and systemic disease (e.g., diabetes)
3. List ocular conditions that are associated with cataract (e.g., uveitis, ocular ischemia, ocular tumors) **
4. List systemic and topical medicine that can cause pathologic changes in the lens (e.g., oral and topical corticosteroid use) **
5. Define the elementary refraction techniques to obtain best-corrected vision prior to considering cataract extraction **
6. Describe the major etiologies of dislocated or subluxated lens (e.g., pseudoexfoliation syndrome, trauma, Marfan syndrome, homocysteinuria, Weill-Marchesani syndrome, syphilis) *
7. Describe the basics of IOL power estimation, including:
 - a. linear regression formulae (e.g., Sanders-Retzlaff-Kraff [SRK] and SRKII) **
 - b. theoretical eye model prediction formulas (e.g., SRKT, Holladay, and Haigis) **
8. Describe the methods to estimate axial eye length, including:
 - a. contact ultrasound **
 - b. immersion ultrasound **
 - c. IOLMaster, LENSTAR, or equivalent, even if equipment is unavailable *
9. Describe the less common causes of lens abnormalities (e.g., spherophakia, lenticonus, ectopia lentis, coloboma) *
10. Describe the preoperative evaluation of the cataract patient, including:
 - a. systemic diseases of interest or relevance to cataract surgery **
 - b. systemic medication of relevance to cataract surgery (e.g., alpha 1 adrenergic blocking agent, blood thinning agents, corticosteroids, tamsulosin [Flomax]) **
 - c. examination of the fundus to detect retinal pathology that may affect the outcome of cataract surgery eg. diabetic retinopathy, retinal holes, macular pathology, retinal detachment, glaucoma **
 - d. relationship of external and corneal diseases of relevance to cataract and cataract surgery (e.g., lid abnormalities, dry eye) **
 - e. management of uveitis prior to and following cataract surgery **
 - f. management of glaucoma prior to and following cataract surgery, including options for postoperative intraocular pressure (IOP) control **
 - g. planning for post-operative target refraction with particular attention to the challenges faced when planning surgery for high myopes and high hypermetropes **
11. Describe the instruments, indications and techniques of cataract extraction, including extracapsular surgery, manual small incision cataract surgery (SICS) and phaco-emulsification and the appropriate choice of each technique **
12. Describe the types, indications, and techniques of anesthesia for cataract surgery in patients of different ages (e.g., topical **, local **, general **)
13. Describe the pathogenesis, clinical presentation, differential diagnosis, evaluation, clinical course, treatment, and outcome of the common complications of cataract and anterior segment surgery (e.g., intraoperative floppy iris syndrome, corneal edema, IOP elevation, hyphema, endophthalmitis, toxic anterior segment syndrome (TASS), cystoid macular

- edema (CME), retinal detachment, IOL dislocation, lens-induced glaucoma, uveitis) **
14. Define the more complex indications for cataract surgery (e.g., visualisation of the posterior segment, lens-induced glaucoma)**
 15. Describe the performance of and describe the complications of more advanced anterior segment surgery (e.g., pseudoexfoliation, small pupils, intraoperative floppy iris syndrome, mature cataract, hard nucleus, post-traumatic, zonular dehiscence, short eye, corneal endothelial diseases) **
 16. Describe the management of cataract in children, including selection of IOL power, need for primary capsulotomy and vitrectomy in certain settings, importance of post op refraction and patching, high risk of posterior capsule opacification, elevated IOP and glaucoma, and other complications
 17. Describe the use of special devices for cataract surgery in complex situations such as capsular tension rings and trypan blue staining of the anterior capsule **
 18. Describe the properties of different ophthalmic viscoelastic devices (OVDs) (e.g., dispersive, cohesive, adaptive) and the advantages and disadvantages for certain phases of surgery
 19. Describe IOL fixation options in the lack of capsular support for in the bag fixation (anterior chamber [AC] IOL, sulcus fixation +/- optic capture, iris fixation, scleral fixation) **
 20. Describe the indications for, techniques of, and complications of cataract extraction in the context of the subspecialty disciplines of the following:
 - a. glaucoma (e.g., combined cataract and glaucoma procedures, glaucoma in cataractous eyes, cataract surgery in patients with prior glaucoma surgery) **
 - b. retina (e.g., cataract surgery in patients with scleral buckles or prior vitrectomy) **
 - c. cornea (e.g., cataract extraction in patients with corneal opacities) **
 - d. ophthalmic plastic surgery (e.g., ptosis following cataract surgery) **
 - e. refractive surgery (e.g., cataract surgery in eyes that have undergone refractive surgery)
 21. List indications for and techniques of intracapsular surgery (e.g., rare cases may require this procedure, or patients may have had the procedure performed previously) *
 22. Describe the indications and options for astigmatism management during cataract surgery (e.g., on axis incision) *
 23. Describe the option for presbyopic correction solutions during cataract surgery (e.g., monovision, multifocal IOLs, accommodative IOLs, dual optic IOLs) *
 24. Describe the government and hospital regulations that apply to cataract surgery **

Clinical assessment

1. Take a history for preoperative cataract **
2. Perform retinoscopy and subjective refraction s for cataract patients **
3. Perform basic slit-lamp biomicroscopy, retinoscopy, and ophthalmoscopy **
4. Evaluate and classify common types of lens opacities **
5. Correlate the level of visual acuity with the lens or capsular opacities **
6. Perform contact and immersion A scan ultrasonography and keratometry and calculate IOL power **
7. Describe the indications for, principles of, and techniques of yttrium aluminium garnet (YAG) laser capsulotomy, and understand the proper timing of YAG laser capsulotomy **

8. Describe techniques other than laser capsulotomy for the treatment of posterior capsule opacification, including surgical capsulotomy

Management

1. Obtain informed consent of cataract patients for surgery, documenting the clinician's explanation of indications for surgery, expected outcomes, the patient's anticipated experience during surgery and common and material risks of surgery**
2. Recognize and treat common postoperative complications of cataract surgery (e.g., endophthalmitis, toxic anterior segment syndrome [TASS], elevated IOP, cystoid macular edema [CME], wound leak, uveitis, capsular block syndrome) **
3. Describe the evaluation and management of common and uncommon causes of postoperative endophthalmitis and TASS **

Technical / surgical skills

1. Perform and document laser capsulotomy on routine cases of posterior capsule opacification **
2. Perform the basic steps of cataract surgery (e.g., incision, wound closure) in the practice lab, if available **
3. Assist with cataract surgery and perform patient preparation, sterile draping, and anesthesia **
4. Describe the techniques to manage a small pupil, including mechanical manipulation, management of iris membrane, use of viscoelastic **
5. Implement the basic preparatory procedures for cataract surgery (e.g., obtaining informed consent, identification of instruments, sterile technique, gloving and gowning, prep and drape, and other preoperative preparation) **
6. Use the operating microscope for basic cataract surgery **
7. Perform extracapsular surgery in a practice setting (e.g., animal or practice lab) **
8. Perform cataract surgery including the following:
 - a. wound construction **
 - b. anterior capsulotomy/capsulorhexis **
 - c. instillation and removal of viscoelastics **
 - d. hydrodissection and hydrodelineation **
 - e. extracapsular, manual small incision and phacoemulsification techniques **
 - f. irrigation and aspiration **
 - g. cortical cleanup **
 - h. IOL implantation (e.g., anterior and posterior) **
 - i. removal of viscoelastic **
 - j. suturing of the wound **
 - k. wound hydration **
9. Perform local injections of corticosteroids, antibiotics, and anesthetics, including retrobulbar and subtenons **
10. Implement advanced applications of viscoelastics in surgery (e.g., control of iris prolapse, elevation of dropped nucleus, viscodissection, aspiration of residual/retained viscoelastic) **
11. Perform intraoperative and postoperative management of any event that may occur during or as a result of cataract surgery *, including:
 - a. vitreous loss **
 - b. capsular rupture **
 - c. anterior or posterior segment bleeding **
 - d. positive posterior pressure **
 - e. corneal burn **

- f. intraoperative floppy iris syndrome **
 - g. choroidal detachments **
 - h. expulsive hemorrhage **
 - i. loss of anesthesia / patient movement **
 - j. use of topical and systemic medications **
 - k. astigmatism *
 - l. postoperative refraction (simple and complex) **
 - m. corneal edema **
 - n. bullous keratopathy
 - o. wound dehiscence **
 - p. hyphema **
 - q. residual cortex **
 - r. dropped nucleus *
 - s. uveitis **
 - t. cystoid macular edema **
 - u. elevated intraocular pressure and glaucoma **
 - v. postoperative early and late intraocular infection **
12. Describe instrumentation and techniques used to implant foldable and non-foldable IOLs **
 13. Describe the causes and indication for performing, repositioning, removal, or exchange of IOLs **

References

Essential reading

1. American Academy of Ophthalmology Basic Clinical Science Course: all volumes, with particular attention to:
 - Section 2: Fundamentals and Principles of Ophthalmology
 - Section 3: Clinical Optics
 - Section 11: Lens and Cataract
2. Gurung R, Hennig A. Small incision cataract surgery: tips for avoiding surgical complications. Community Eye Health. 2008 March; 21(65): 4–5Greenhorns. [Blog, available from: <http://www.cataractsurgeryforgreenhorns.blogspot.net>]. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2377379/pdf/jceh_21_65_004.pdf
3. Haldipurkar SS, Shikari HT, Gokhale V. Wound construction in manual small incision cataract surgery. Indian J Ophthalmol 2009;57:9-13<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2661512/?report=printable>

Additional reading

1. Seibel B: Phacodynamics, Fourth Edition Slack Incorporated, 2005
2. Steinert, RF Cataract Surgery, Third Edition, Saunders Elsevier, 2010
3. Garg A et al. Masters guide to manual small incision cataract surgery (MSICS). Jaypee Brothers Medical Publishers
4. Natchiar G. Aravind guide to small incision cataract surgery. 2004. <http://www.aravind.org/publications/Manuals.aspx>

CORNEA AND EXTERNAL DISEASES

Disorders of the ocular surface are some of the most common causes of patients presenting to an ophthalmologist. A thorough knowledge of the diagnosis, examination, investigation and treatment of diseases of the cornea and external eye is essential for the trainee ophthalmologist.

Learning Objectives

At the end of the course, residents should be able to:

- Demonstrate an understanding of the basic sciences (anatomy, physiology, optics, microbiology and immunology) as applied to disorders of the cornea and external eye.
- Take an accurate medical and ocular history relevant to corneal and external eye conditions
- Perform and document the results of eye examinations necessary for diagnosis and treatment of corneal and external eye conditions
- Describe and recognize corneal and external eye conditions
- Prepare and implement a management plan for corneal and external eye conditions

Basic Science

1. Describe the anatomy, physiology, pathology, microbiology, immunology, genetics, epidemiology of diseases of the cornea, conjunctiva, sclera, eyelids, lacrimal apparatus, and ocular adnexa **
2. Understand the fundamentals of corneal optics and refraction **
3. Describe the basic principles of ocular pharmacology of anti-infective, anti-inflammatory, and immune modulating agents (e.g., indications and contraindications for topical corticosteroids, non-steroidal anti-inflammatory agents, and antibiotics) **

Clinical Science

Clinical assessment and Management

Examination

1. Perform external examination (illuminated and magnified) and slit-lamp biomicroscopy, including drawing of anterior segment findings and use of the slit beam to assess the depth and extent of lesions**
2. Administer topical anesthesia, as well as special topical stains of the cornea (e.g., fluorescein dye, lissamine green) **
3. Perform tests for dry eye (e.g., Schirmer test, tear film breakup time, and dye disappearance) **
4. Perform corneal sensation testing (e.g., cotton-tipped swab) **
5. Perform tonometry (e.g., applanation, Tono-Pen, Schiøtz, pneumotometry) and pachymetry **
6. Perform techniques of sampling for bacterial, fungal, viral and protozoal ocular infections (e.g., corneal scraping and appropriate culture techniques) **
7. Perform a Seidel test **
8. Correlate the visual acuity with the density of media opacity (e.g., cataract, corneal scars, edema), and evaluate the etiology of discordance between acuity and findings from examination of the media **
9. Perform keratometry**

Trauma

1. Describe the mechanisms and treatment of traumatic and toxic injury to the anterior segment (e.g., chemical and thermal burns, lid laceration, orbital fracture) **
2. Recognize and treat corneal lacerations (perforating and non-perforating), anterior segment trauma**
3. Recognize and treat foreign body, animal, and plant substance injuries and understand the risk of injury with organic material **
4. Recognize and treat hyphema (e.g., indications for surgery) **

Ocular Surface Disease

1. Recognize and treat lid margin disease (e.g., staphylococcal blepharitis, meibomian gland dysfunction) **
2. Describe the symptoms, signs, testing, and evaluation of dry eye (e.g., Schirmer test); and treatment for dry eye **
3. Describe the etiologies and treatment of superficial punctate keratopathy (e.g., dry eye, Thygeson superficial punctate keratopathy, neurotrophic keratitis, blepharitis, toxicity, ultraviolet photokeratopathy, contact lens-related keratitis) **
4. Describe the epidemiology, differential diagnosis, evaluation, and management of vitamin A deficiency (e.g., Bitot spot, dry eye) **
5. Recognize and treat recurrent corneal erosions **
6. Describe the classification, pathology, indications for surgery, and prognosis of common eyelid abnormalities (e.g., blepharoptosis, trichiasis, distichiasis, essential blepharospasm, entropion, ectropion) and understand their relationship to secondary diseases of the cornea and conjunctiva (e.g., exposure keratopathy) **
7. Recognize, evaluate, and treat the ocular complications of exposure keratopathy, contact dermatitis, and rosacea **
8. Diagnose and treat the most severe corneal exposure cases (e.g., conjunctival flap [Gunderson flap]) **
9. Describe the indications for ocular surface transplantation, including:
 - conjunctival autograft/flap **
 - amniotic membrane transplantation*
 - limbal stem cell transplantation *

Infectious Diseases of the External Eye

1. Describe the differential diagnosis and treatment of acute and chronic conjunctivitis or red eye (e.g., scleritis, episcleritis, conjunctivitis, orbital cellulitis, gonococcal and chlamydial conjunctivitis) **
2. Recognize, evaluate, and treat chronic conjunctivitis (e.g., chlamydia, trachoma, molluscum contagiosum, Parinaud oculoglandular syndrome, ocular rosacea) **
3. Describe key features of trachoma, including epidemiology, clinical features, staging, and its complications (e.g., cicatrization), prevention (e.g., facial hygiene), and topical and systemic antibiotic treatment), and surgery (e.g., tarsal rotation) **

Immune-Related Disorders of the External Eye

1. Recognize and treat:
 - a. pyogenic granuloma *
 - b. the presentations of ocular allergy (e.g., phlyctenules, seasonal hay fever, vernal keratoconjunctivitis, allergic and atopic conjunctivitis, giant papillary conjunctivitis) **

- c. the external manifestations of anterior segment inflammation (e.g., red eye associated with acute and chronic iritis) **
2. Describe more complex differential diagnosis of red eye (e.g., autoimmune and inflammatory disorders causing scleritis, episcleritis, conjunctivitis, orbital cellulitis) **
3. Describe differential diagnosis, evaluation, and treatment of interstitial keratitis (e.g., syphilis, viral diseases, noninfectious, immunologic, inflammation) **
4. Describe the clinical features, pathology, evaluation, and treatment of ocular cicatricial pemphigoid and Stevens-Johnson syndrome **

Neoplastic Disorders of the Conjunctiva and Cornea

1. Describe the epidemiology, differential diagnosis, evaluation, and management of benign and malignant lid lesions, including pigmented and non-pigmented lesions of the ocular surface and lid (e.g., nevi, melanoma, primary acquired melanosis, ocular surface squamous neoplasia) **
2. Manage and treat more complex neoplasms of the conjunctiva (e.g., ocular surface squamous neoplasia, malignant melanoma) **

Corneal Dystrophies and Ectasias

1. Recognize the classic corneal dystrophies (e.g., map-dot-fingerprint dystrophy, lattice dystrophy, granular dystrophy, macular dystrophy, Fuchs endothelial dystrophy) **
2. Describe the surgical indications (e.g., Fuchs endothelial dystrophy, aphakic/pseudophakic bullous keratopathy, keratoconus), surgical techniques, and recognition and management of postoperative complications (especially immunologically-mediated rejection) of corneal transplantation (e.g., penetrating, lamellar) *

Depositions and Degenerations of the Conjunctiva, Cornea and Sclera

1. Recognize and treat corneal or conjunctival presentations of degenerations (e.g., inflamed, atypical, or recurrent pterygium, band keratopathy, Salzmann nodular degeneration, benign and malignant tumors) **
2. Describe the epidemiology, clinical features, pathology, evaluation, and treatment of peripheral corneal thinning disorders or ulceration (e.g., Terrien marginal degeneration, Mooren ulcer, rheumatoid arthritis-related corneal melt, dellen) **
3. Recognize the anterior segment manifestations of systemic diseases (e.g., Wilson disease) and pharmacologic side effects (e.g., amiodarone vortex keratopathy) *

Congenital Anomalies of the Cornea and Sclera

1. Describe congenital abnormalities of the cornea, sclera, and globe and associated systemic manifestations (e.g., Peter anomaly, microphthalmos, birth trauma, buphthalmos, Axenfeld-Rieger syndrome, aniridia, hamartomas and choristomas) **

Technical / surgical skills

Trauma:

- irrigation of chemical burn to the eye**
- removal of a conjunctival or corneal foreign body (e.g., rust ring) **
- corneal debridement**
- corneal laceration repair
- lid laceration repair **

Eyelid procedures:

- epilation**
- punctal occlusion (temporary or permanent) or insert plugs **
- incision, drainage, and/or removal of a primary chalazion/stye **
- incisional or excisional biopsy of a lid lesion **
- lateral tarsorrhaphy **

Corneal/ conjunctival procedures

- pterygium surgery with autologous conjunctival transplantation**
- stromal micropuncture *
- conjunctival biopsy**
- excision of conjunctival lesion, with autograft if indicated**
- corneal biopsy**
- corneal gluing**
- thin conjunctival flap (e.g., Gunderson flap) **

Complete process of getting the donor eye by cooperating with the Eye Bank**

- enucleate the donor eye
- evaluate the whole globe
- preservation of donor corneal scleral rim
- Assist at penetrating keratoplasty*

References

Essential reading

1. Basic and Clinical Science Course. Section 8: External Disease and Cornea. San Francisco: American Academy of Ophthalmology.
2. Clinical Ophthalmology: A Systematic Approach: Expert Consult, 7th edition Jack J. Kanski and Brad Bowling.

Additional reading

1. Krachmer JH, Mannis MJ, Holland EJ. Cornea: Fundamentals, Diagnosis, and Management 3 ed. Mosby Elsevier, 2011.
2. Vajpayee RB. Corneal Transplantation 2nd edition. Jaypee Brothers Medical Publishers (P) Ltd, New Delhi.
3. Yanoff N, Duker JS. Ophthalmology 3 ed. Mosby Elsevier, 2009 (Chapter 4).
4. Friedman NJ, Kaiser PK, Trattler WB. Review of Ophthalmology. Elsevier Saunders 2005, Philadelphia. Pp 197-234.

Suggested Journals

1. Cornea: The Journal of Cornea and External Disease
<http://journals.lww.com/corneajrnl/pages/default.aspx> for abstracts
2. Journal of Cataract and Refractive Surgery
http://ees.elsevier.com/jcrs/http://www.elsevier.com/wps/find/journaldescription.cws_home/620025/description - description for abstracts

GLAUCOMA

Glaucoma is a blinding disease if it is not diagnosed and treated early in its course. It remains the second leading cause of blindness globally. In South-East Asia there is a relatively high prevalence of angle closure. It is estimated that 30,000 Cambodians have glaucoma, with an estimated 90,000 glaucoma suspects.

The trainee ophthalmologist must learn to provide comprehensive glaucoma care, using surgical treatment (or laser treatment, where available). The trainee must also learn to differentiate glaucoma from other optic neuropathies and causes of visual field defect. Every patient presenting for the first time in clinics should be assessed comprehensively to allow the detection and therefore timely treatment of this asymptomatic blinding condition.

A good foundation in the basic sciences as applied to glaucoma, including anatomy, ocular physiology, optics and wound healing facilitates understanding of the disease and its treatment.

Learning Objectives

- Understand and apply the principles of the basic sciences relevant to glaucoma
- Take an accurate medical and ocular history relevant to glaucoma
- Perform and document the results of eye examinations necessary for diagnosis and treatment of glaucoma
- Describe and recognize glaucoma
- Prepare and implement a management plan for glaucoma
- Formulate and implement a surgical plan based on a careful evaluation of the patient, including recognizing and managing any post-operative complications
- Communicate successfully to patients a basic understanding of the disease and of their important role in its successful management

Basic Science

1. Describe the anatomy of the anterior chamber, angle, and ciliary body **
2. Describe the anatomy of the retinal nerve fiber layer, optic nerve head, and visual pathway from the retina to the visual cortex **
3. Describe the microscopic anatomy of the retina from inner to outer portions, with attention to the retinal ganglion cell layer and nerve fiber layer **
4. Describe the blood supply of the optic nerve and ciliary body **
5. Describe the apoptotic mechanism of retinal ganglion cell death *
6. Describe the mechanisms and dynamics of aqueous humor inflow and outflow **
7. Know the physiology underlying visual-field examination and its interpretation **
8. Describe the fundamentals of standard automated perimetry **
9. Describe the population distribution of IOP and the distribution of IOP in glaucoma patients
10. Know basic principles of tonometry and aqueous outflow, and applications of tonometric data (e.g., normal range, diurnal curve, peak and trough values) **
11. Describe and understand basic principles of Goldmann applanation tonometry **

12. Describe basic principles of tools to analyze optic nerve and retinal nerve fiber layer such as optical coherence tomography (OCT), Heidelberg Retina Tomograph (HRT), and scanning laser polarimetry (GDx) *
13. Know the principles of laser **
14. Know the pharmacology of various anti-glaucoma medications**
15. Understand the principles of wound healing and wound healing modulation **

Clinical Science

Background knowledge

1. Define glaucoma **
2. Describe the major risk factors for primary open-angle glaucoma and angle-closure glaucoma **
3. Know the role of intraocular pressure (IOP) in the development and progression of glaucoma. Including the fact that elevated IOP is not synonymous with glaucoma, nor does a normal IOP exclude the presence of glaucoma**
4. Understand the factors that influence IOP **
5. Understand and describe the classification of glaucoma, including primary and secondary disease **
6. Know the epidemiology of congenital glaucoma, primary open-angle glaucoma, exfoliation syndrome and exfoliative glaucoma, pigment dispersion syndrome and pigmentary glaucoma, and angle-closure glaucoma *
7. Understand the pathophysiology of the glaucomas **
8. Know the genetics of:
 - a. primary congenital glaucoma *
 - b. primary open angle glaucoma *
 - c. aniridia *
 - d. Axenfeld-Rieger syndrome *
9. Describe the major results of large prospective clinical trials **:
 - a. The Glaucoma Laser Trial (GLT)
 - b. The Ocular Hypertension Treatment Study (OHTS)
 - c. The Collaborative Initial Glaucoma Treatment Study (CIGTS)
 - d. The Fluorouracil Filtering Surgery Study (FFSS)
 - e. The Normal Tension Glaucoma Study (NTGS)
 - f. The Advanced Glaucoma Intervention Study (AGIS)
 - g. The Early Manifest Glaucoma Trial (EMGT)

Clinical assessment

1. Describe and perform the steps in assessing patient for glaucoma **
2. Describe and identify the clinical features of glaucomatous optic neuropathy **
3. Describe and identify the clinical features of the primary and secondary glaucomas **
4. Describe tonometers (e.g., Schiøtz, Tono-Pen airpuff tonometer, iCare), perform tonometry and recognize artifacts of testing **
5. Describe principles and basic techniques of gonioscopy (Goldmann, 3- or 4-mirror lenses) to evaluate angle structures **
6. Perform gonioscopy and describe normal and abnormal angle findings **
7. Describe and perform corneal pachymetry. Understand how the biomechanics and measurements of corneal thickness affect IOP interpretations *
8. Understand the principles of slitlamp biomicroscopy with a 90D or 78D lens and indirect ophthalmoscopy to evaluate the optic nerve and retinal nerve fiber layer **
9. Interpret HRT, OCT, and GDx scans

10. Describe the most common types of visual field defects in glaucoma **
11. Describe and interpret more advanced forms of perimetry (kinetic and automated static), including various perimetry strategies such as threshold testing, suprathreshold testing, and special algorithms
12. Describe the principles involved in determining glaucomatous progression both clinically and perimetrically *

Management

Medical management

1. Describe target IOP and its use in glaucoma management *
2. Describe principles and mechanisms of medical management of glaucoma **
3. Describe major classes of glaucoma medications, their mechanisms of action, indications, contraindications, and side effects (topical and systemic) **
4. Know drug interactions between systemic drugs and glaucoma drugs **
5. Describe pitfalls of medical treatment, in particular poor compliance and adherence **

Technical/surgical skills

1. Describe the principles, indications, and techniques of various types of laser energy, spot size, and laser wavelengths *
2. Describe the principles, indications, and techniques of trabeculectomy (with or without cataract surgery, with or without antimetabolites) and glaucoma drainage devices, and cyclodestructive procedures **
3. Describe the principles, indications, and techniques of cyclodestructive procedures *
4. Perform argon or selective laser trabeculoplasty for open-angle glaucoma *
5. Perform argon or YAG laser iridotomy for angle closure **
6. Perform surgical peripheral iridectomy for angle closure **
7. Perform peripheral iridoplasty **
8. Perform laser suture lysis
9. Perform cyclodestructive surgery (photocoagulation or cryotherapy) *
10. Assist with trabeculectomy and glaucoma drainage device surgery **
11. Describe and manage a flat anterior chamber post drainage surgery **
12. Describe use of antimetabolites and anti-angiogenic agents and potential complications from their use **
13. Recognize glaucoma surgical complications, their etiologies, and understand options for treatment **
14. Perform routine trabeculectomy **
15. Perform tube surgery
16. Describe and treat intraocular infections resulting from filtering blebs or other glaucoma procedures **
17. Describe new non-penetrating glaucoma surgery techniques: principles, techniques, advantages, limitations, and complications
18. Describe new microsurgical devices (e.g., Ex-Press, iStent, gold shunt, Trabectome) used in glaucoma surgery

References

Essential reading

1. American Academy of Ophthalmology Basic Clinical Science Course: all volumes, with particular attention to:
 - a. Section 2: Fundamentals and Principles of Ophthalmology
 - b. Section 10: Glaucoma
2. Asia Pacific Glaucoma Guidelines 2nd edition
<http://www.apglaucomasociety.org/content/view/457/>
3. Kanski JJ and Bowling B, Clinical Ophthalmology: A Systematic Approach:

Expert Consult, 7th edition

4. American Academy of Ophthalmology: Color Atlas of Gonioscopy (Book and DVD)
5. Heijl A, Patella VM and Bengtsson B (2012). *Effective Perimetry – The Field Analyzer Primer, 4th Ed.* Carl Zeiss Meditec Inc, Jena

Additional reading

1. Atlas of Glaucoma. Second Edition. Neil T. Choplin and Diane C. Lundy
2. Association of International Glaucoma Societies Consensus Series, Kugler Publications
3. Glaucoma: Tarek M Shaarawy, Mark B Sherwood, Roger A Hitchens, Jonathan G Crowston, Saunders Elsevier 2009
4. Scientific papers on important areas of the curriculum – referenced within essential reading texts.

NEURO-OPHTHALMOLOGY

Neuro-ophthalmology deals with visual problems that arise from a neurological source. These conditions may not only compromise sight, but may also be life-threatening. The ophthalmology trainee must develop a thorough understanding of the neuroanatomy of the visual pathway, be able to make reliable differential diagnoses of neurologically-based conditions and formulate an appropriate management plan, which may include referral to other specialists e.g. neurologist/neurosurgeon.

Learning Objectives

At the end of the course, residents should be able to:

- Demonstrate a thorough understanding of the anatomy of relevant features (skull, orbit, brain, vascular system, cranial nerves)
- Select the most appropriate test and imaging to diagnose and manage neuroophthalmic conditions
- Describe the association between pupil and eyelid position and ocular motor pathology
- Demonstrate understanding of the pathophysiology and management of diplopia and central eye movement disorders
- Assess eye movement disorders and the ocular motor system
- Formulate differential diagnoses based on appropriate investigations
- Identify the effects of systemic disorders on visual and ocular motor pathways
- Recognise the possible systemic significance of ophthalmic disorders
- Be able to detect and interpret the presence of a relative afferent pupillary defect (RAPD) and incorporate this into routine patient examination
- Be able to perform and interpret confrontation visual field testing

Basic Science

1. Describe the neuroanatomy of the visual pathways **
2. Describe the anatomy and functions of cranial nerves 2-8 **
3. Describe the anatomy of the bony orbit *
4. Describe the pupillary and accommodative neuroanatomy **
5. Describe ocular motility and related neuronal pathways **

Clinical Science

Clinical assessment and management

1. Describe a systematic, sign-and-symptom-oriented neuroophthalmic patient interrogation (i.e., history taking) and recording techniques **
2. Perform basic visual function tests (e.g., visual acuity, color vision testing, Amsler grid, contrast sensitivity testing) **
3. Perform tests of binocularity and fusion (e.g., polarized Titmus stereo test, Worth 4-dot test) **
4. Perform a pupillary examination **
5. Describe indications for and perform basic pharmacologic pupillary testing for Horner syndrome, pharmacologic dilation, and tonic pupil **
6. Describe and detect a relative afferent pupillary defect **
7. Detect light-near dissociation**
8. Perform a basic assessment of ocular alignment **
9. Use simple observational techniques to assess the presence of phoria/tropia (e.g., Hirschberg test, Krimsky method) **
10. Describe and perform basic cover/uncover testing for tropia **

11. Describe and perform alternate cover testing for phoria **
12. Perform simultaneous prism and cover testing **
13. Perform measurement of deviations with prisms **
14. Perform basic direct, indirect, and magnified ophthalmoscopy examination of the optic disc, macula, vessels, and periphery of the retina and use the findings to generate a differential diagnosis **
15. Perform basic neurologic screening examination (e.g., tandem walk, sensory examination, cerebellar function testing, basic cognitive evaluation).
16. Describe the indications for and in a clinical setting perform forced duction and forced generation testing
17. Perform a complete evaluation of the major ocular motor systems (e.g., fixation, pursuit, saccades, convergence, vestibuloocular reflex) *
18. Perform an evaluation of eyelids (e.g., assess lid position, measure palpebral fissure, quantify levator function) **
19. List the indications for visual field testing and interpret standard clinical perimetry programs *
20. Perform confrontational field testing (e.g., static and kinetic, central and peripheral, red and white targets) **
21. Describe the indications for and perform basic kinetic perimetry and interpret results **
22. Describe the indications for and perform basic automated perimetry and interpret results *
23. Describe the format of standard clinical tests (e.g., light stimulus, background illumination, test points).
24. Describe the anatomy and indications for CT scanning **
25. Describe the indications for and apply Fresnel and grind-in prisms
26. Describe the indications for and interpret basic echography (ultrasound) of the orbits.
27. Perform exophthalmometry **
28. Check pulse, blood pressure in both arms, carotid bruit, and heart sounds **
29. Describe indications and interpret blood test results for various systemic disorders with neuroophthalmic manifestations (e.g., thyroid disorders, pituitary disorders, myasthenia gravis).
30. Describe syndromes of cortical visual dysfunction.
31. Detect early neuroophthalmic signs and symptoms of drug toxicity for commonly used medications.
32. Describe the neuroophthalmic complications related to pregnancy.
33. Describe, evaluate, and provide appropriate genetic counseling for inherited neuroophthalmic diseases (e.g., hereditary optic neuropathies, chronic progressive external ophthalmoplegia, neurofibromatosis, ataxia syndromes) *
34. Describe the features, evaluation and management of:
 - a. urgent neuroophthalmic pathologies (e.g., giant cell arteritis, cavernous sinus thrombosis, orbital apex syndrome, pituitary apoplexy) **
 - b. optic neuropathies (e.g., infectious, demyelinating, ischemic, inflammatory, hereditary, toxic, nutritional, compressive, infiltrative) **
 - c. ocular motor neuropathies (third, fourth and sixth nerve palsy)**
 - d. cavernous sinus syndrome**
 - e. superior orbital fissure syndrome**
 - f. common efferent pupillary abnormalities (e.g., Horner syndrome, third nerve palsy, tonic pupil, light-near dissociation) **
 - g. visual field defects (e.g., optic nerve, optic chiasm, optic radiation, occipital cortex) **
 - h. carotid-cavernous fistula *

- i. congenital optic nerve abnormalities (e.g., optic pit, disc coloboma, papillorenal syndrome, morning glory syndrome, tilted disc, optic nerve hypoplasia, myelinated nerve fiber layer, melanocytoma, disc drusen, Bergmeister papilla) *
- j. supranuclear and internuclear palsies (e.g., internuclear ophthalmoplegia, vertical gaze palsy) *
- k. giant cell arteritis**
- l. neuroophthalmic aspects of thyroid eye disease **
- m. congenital nystagmus versus acquired nystagmus **
- n. neuroophthalmic aspects of common systemic diseases (e.g., hypertension, diabetes, thyroid disease, myasthenia gravis, temporal arteritis, sarcoidosis, systemic infections, inflammation) **
- o. neuroophthalmic findings that are common following head trauma (e.g., traumatic optic neuropathy, bilateral fourth nerve palsy, traumatic brain injury) **
- p. neuroophthalmic aspects of systemic diseases (e.g., malignant hypertension, diabetic papillopathy, toxicity of systemic medications, paraneoplastic syndromes, HIV/AIDS) **
- q. non-organic visual loss *
- r. common pathologic findings of brain and orbits on CT and MRI related to neuro-ophthalmology **
- s. transient monocular visual loss **

Technical / surgical skills

1. Describe the indications for, perform, and list the complications of temporal artery biopsy **
2. Plan and perform ophthalmic surgery in cranial nerve palsies *
3. Perform and interpret the results of the intravenous edrophonium (i.e., Tensilon) and prostigmine tests for myasthenia gravis; recognize and treat the complications of the procedures
4. Describe indications, dose, and administration of botulinum toxin for neuroophthalmic disorders (e.g., hemifacial spasm, blepharospasm, paralytic strabismus)

References

Essential reading

1. American Academy of Ophthalmology Basic and Clinical Science Course. Section 5: Neuro-ophthalmology. San Francisco: American Academy of Ophthalmology.
2. Pane A, Burdon M, Miller NR. The Neuro-ophthalmology survival guide. Mosby/Elsevier, 2007

Additional reading

1. Walsh and Hoyt's Clinical neuro-ophthalmology: The Essentials. 2nd ed. Miller NR, Newman NJ, Kerrison J, Biousse V (eds). Lippincott Williams and Wilkins, 2008.
2. The John A Moran Eye Centre Neuro-Ophthalmology Collection. Available at: Neuro-Ophthalmology Virtual Education Library (NOVEL) <http://novel.utah.edu/>

OPHTHALMIC PATHOLOGY

This standard describes the knowledge and skills an ORT trainee must master to understand the origins of ocular disease.

Learning Objectives

At the end of the course, residents should be able to:

- Use their understanding of pathology to inform the investigation, diagnosis and planning of treatment of ocular disease
- Use the correct procedures to collect specimens; order appropriate testing and be aware of any limitations of such testing; and, be able to interpret test results
- Use their knowledge of genetics for diagnosis, prognosis and genetic counselling of patients and their families

Basic Science

1. Describe ocular anatomy (including common variants) and histology of the major structures of the eye and its adnexa, with an emphasis on the clinical relevance to specialty areas e.g. oculoplastics, cornea, glaucoma, retina, ophthalmic oncology:
 - conjunctiva **
 - cornea **
 - sclera **
 - anterior chamber **
 - posterior chamber **
 - iris **
 - ciliary body **
 - lens *
 - vitreous **
 - retina and retinal pigment epithelium **
 - choroid **
 - optic nerve **
 - visual pathway **
 - eyelids **
 - extraocular muscles **
 - lacrimal system **
 - orbit **

Clinical Science

1. Describe the pathophysiology and histology of potentially vision or life-threatening diseases (e.g., temporal arteritis, endophthalmitis, retinoblastoma, ocular melanoma, extraocular or orbital spread of an intraocular or periorbital tumor, metastasis to the eye and orbit) relevant to specific clinical rotation(s) (e.g., oculoplastics, cornea, glaucoma, retina, ophthalmic oncology) **
2. Describe basic pathophysiology of the common disease processes of the eye and its adnexa, and identify the major histologic findings in:
 - congenital anomalies**
 - degeneration **
 - dystrophy **
 - inflammation: infectious and noninfectious **

- neoplasm and proliferation **
- trauma**

as applied to the following structures:

- conjunctiva
 - cornea
 - anterior chamber and trabecular meshwork
 - sclera, lens, vitreous
 - retina and retinal pigment epithelium
 - uveal tract
 - eyelids, orbits
 - optic nerve
- Describe common indications for frozen sections in ophthalmic pathology (e.g., complete resection margins in basal and squamous cell carcinoma, demonstration of lipid in sebaceous gland carcinoma) **
 - Describe and interpret reports of more advanced techniques in ophthalmic histopathology (e.g., cytology, special stains, transmission electron microscopy, immunohistochemistry, flow cytometry, molecular genetics) relevant to specific clinical rotation(s) (e.g., oculoplastics, cornea, glaucoma, retina, ophthalmic oncology), including how the clinician communicates the need for these studies **

Management

- Describe the professional duties and the specific and unique aspects of professionalism of ophthalmic pathology, as well as the significance of ophthalmic pathology to the practice of ophthalmology **
- Demonstrate understanding of hospital or other protocols for the referral of tissue samples for examination by an ophthalmic pathologist
- Describe basic information necessary to communicate to the ophthalmic pathologist regarding study of these specimens **
- Describe and be able to demonstrate compliance with tracking system for pathology referrals and follow up of results **
- Describe and be able to demonstrate compliance with systems that ensure test results are followed up and documented in the patient record **
- Describe and be able to demonstrate that results of tests and recommended actions are communicated to the patient or carer and other health professionals involved in patient care
- Describe and be able to demonstrate that appropriate management plans, and any follow-up schedule is devised and implemented **
- Describe and apply hospital protocols for the collection of donor tissues

Technical / surgical skills

- Describe common methods of specimen acquisition and handling for ophthalmic pathology, especially handling methods that avoid artifacts and ensure representative sampling:
 - surgical biopsy, with special emphasis on the eyelids and conjunctiva, cornea, and vitreous **
 - resection margin marking **
 - enucleation **
 - exenteration **
 - impression cytology *
 - fine needle aspiration biopsy
- Describe basic steps in handling and processing of gross specimens in the ophthalmic pathology laboratory through a site visit, with relevance to ophthalmic surgery *

3. Process specimens for submitting to an ophthalmic pathology laboratory, and write the accompanying letter to the ophthalmic pathologist (e.g., surgical biopsy, corneal button, enucleated eye, exenteration specimen) **
4. Read and interpret reports on these specimens written by the ophthalmic pathologist **
5. Participate as an observer through a site visit in the macroscopic and microscopic examination of ophthalmic pathology specimens from active cases
6. Participate as an “at-the-elbow” observer during microscopic examination of active ophthalmology cases, including special stains.
7. Participate in gross examination and cutting of common ophthalmic pathology specimens (e.g., eyelid biopsies, corneas, whole globes), and take macroscopic and microscopic photographs to document pathologies *
8. Prepare a basic histologic specimen (e.g., hematoxylin-eosin stain) for review by the ophthalmic pathologist
9. Perform microscopic examination of a specimen under supervision, and participate in writing the report, preferably previewing slides in advance of the pathologist to come up with a diagnosis and to suggest special stains and immunohistochemistry without the influence of the ophthalmic pathologist, followed by reviewing the report and special stain orders with the latter.

References

Essential reading

1. Forrester JV, Dick AD, McMenamin PG, Roberts F (2008). *The Eye: Basic Sciences in Practice*, 3rd Edition WB Saunders, London, UK [ISBN: 978-0-7020-2841-0]. Chapter 7 (pp. 426–434) and Chapter 9 (pp. 465–515)
2. American Academy of Ophthalmology Basic and Clinical Science Course. Section 4: Ophthalmic Pathology and Intraocular Tumors. San Francisco: American Academy of Ophthalmology
3. Sehu WK, Lee W. *Ophthalmic Pathology: An Illustrated Guide for Clinicians*. Blackwell Publishing, 2006 (eBook 2008)

Additional reading

1. Eagle RC. *Eye Pathology: An Atlas and Text*. 2nd Edition, Lippincott Williams & Wilkins, 2011 (eBook 2011).
2. Yanoff M, Sassani JW. *Ocular Pathology*. 6th Edition. Mostby, 2009
3. The Royal College of Ophthalmologists, Winter 2010 - Histopathology and cytology specimens - what should you send, and to whom? http://www.rcophth.ac.uk/core/core_picker/download.asp?id=710&filetitle=Focus+Winter+2010

OCULOPLASTIC SURGERY AND ORBIT

The successful practice of oculoplastic surgery requires careful diagnosis and treatment planning to balance outcomes for vision, function and appearance in cases of trauma or disease.

Learning Outcomes

By the end of the course, residents should be able to:

- Demonstrate understanding of the anatomy and physiology of the oculofacial, orbital and lacrimal systems
- Take an ocular history relevant to oculofacial, orbital and lacrimal conditions
- Perform oculofacial, orbital and lacrimal examinations
- Characterise oculofacial, orbital and lacrimal conditions
- Develop and implement a management plan for oculofacial, orbital and lacrimal conditions

Basic Science

Anatomy

1. Describe the anatomy of the orbit, including dimensions, topographic relationships, apertures, soft tissues and periorbital structures **
2. Describe the anatomy of the face and eyelids, including skin and subcutaneous tissue, protractors, orbital septum, orbital fat, retractors, tarsus and conjunctiva **
3. Describe the development of the secretory and excretory apparatus of the lacrimal system *
4. Describe the anatomy of the secretory and excretory apparatus of the lacrimal system **
5. Identify normal orbital and relevant nasal and paranasal sinus anatomy on imaging studies (e.g., computed tomography, magnetic resonance imaging) **

Physiology

1. Describe the mechanisms of tear production **
2. Describe the mechanisms of tear drainage, including lacrimal pump theories **

Clinical Science

Clinical assessment

1. Perform a thorough evaluation for orbital disorders:
 - a. history, including the relevance of pain, progression of symptoms, and periorbital changes **
 - b. eyelid examination including lid position, disturbances of eyelid structure, palpebral aperture, ptosis and levator function **
 - c. orbital examination including periorbital structures and function, ocular motility, proptosis and globe position in three dimensions **
 - d. perform examination for less common eyelid abnormalities (e.g., decreased blink, orbicularis weakness, contour abnormalities, marginal entropion) **
 - e. describe indications for and perform forced duction testing *
2. Describe indications for and perform the basic office examination techniques for the most common orbital abnormalities (e.g., Hertel measurement, inspection, palpation, auscultation) **

3. Perform a thorough clinical examination in the setting of trauma, including orbital floor fracture, muscle entrapment, retrobulbar haemorrhage, lid lacerations
4. Identify common orbital pathology (e.g., orbital fractures, orbital tumors) on imaging studies (e.g., X rays, computed tomography, ultrasound, magnetic resonance imaging) *
5. Identify indications for and perform more advanced socket assessment (e.g., types of implants, implant movement, socket health, socket surface, socket volume, fornices, anophthalmic socket complications, prosthesis type and fit)

Clinical knowledge

Eyelids

1. Describe basic mechanisms and indications for treatment of eyelid trauma and understand the differences between injuries sparing the lid margin, involving the lid margin and involving the canaliculus **
2. Describe the mechanisms and indications for treatment of chemical burns, thermal burns, canthal avulsions, eyelid avulsions **
3. Describe the features, evaluation, and treatment of preseptal cellulitis versus orbital cellulitis **
4. Describe mechanisms and indications for treatment of ptosis **
5. Describe mechanisms and indications for treatment of upper and lower eyelid retraction *
6. Describe mechanisms and indications for treatment of entropion **
7. Describe mechanisms and indications for treatment of ectropion **
8. Describe the genetics (where known), clinical features, evaluation, and treatment of congenital eyelid deformities (e.g., coloboma, distichiasis, epicanthus, telecanthus, blepharophimosis, ankyloblepharon, epiblepharon, euryblepharon, cryptophthalmia, Goldenhar syndrome, Treacher-Collins syndrome, Waardenburg syndrome) *
9. Describe clinical features, evaluation, syndromic association and management of congenital ptosis (e.g., simple, blepharophimosis-ptosis-epicanthus inversus syndrome [BPES], jaw wink, congenital fibrosis) **
10. Describe the genetics (when applicable), clinical features, evaluation, and treatment of acquired myogenic ptosis (e.g., oculopharyngeal muscular dystrophy, mitochondrial myopathies, myotonic dystrophy, myasthenia gravis)
11. Describe the clinical features, evaluation, and treatment of acquired neurogenic ptosis (e.g., third nerve palsy, Horner syndrome) **

Lacrimal

1. Describe the mechanisms and indications for treatment of more advanced lacrimal trauma (e.g., nasolacrimal duct obstructions resulting from facial fractures) *
2. Describe features, evaluation, and treatment of more complicated cases of nasolacrimal duct obstruction, canaliculitis, dacryocystitis, and acute and chronic dacryoadenitis **
3. Describe the genetics, clinical features, evaluation, and management of lacrimal dysgenesis
4. Describe the etiology, evaluation, and medical and surgical treatment of the following lacrimal diseases:
 - a. punctal stenosis **
 - b. canalicular stenosis **
 - c. common canalicular stenosis **

Orbital

1. Describe typical and atypical features and describe the differential diagnosis, clinical features, and treatment of:
 - a. orbital infections (e.g., orbital cellulitis, mucormycosis, aspergillosis) **
 - b. trauma (e.g., fractures, foreign body, retrobulbar hemorrhage, traumatic optic neuropathy) **
 - c. thyroid eye disease **
 - d. nonspecific orbital inflammation **
 - e. congenital tumors (e.g., dermoid)*
 - f. lacrimal gland tumors (e.g., benign mixed tumor, adenoid cystic carcinoma, malignant mixed tumor, lymphoma)*
 - g. neural tumors (e.g., optic nerve glioma/meningioma, neurofibromatosis, neuroblastoma, schwannoma)*
 - h. sarcomas (e.g., rhabdomyosarcoma, leiomyosarcoma, liposarcoma, osteosarcoma)
 - i. lymphoid lesions (e.g., lymphoid hyperplasia, lymphoma, leukemia)*
 - j. metastatic lesions (e.g., from breast, prostate, lung, colon)*
 - k. fibro-osseous disorders and tumors (e.g., fibrous dysplasia, osteoma, chondrosarcoma, osteosarcoma, paget disease)
 - l. vascular tumors (e.g., capillary hemangioma, cavernous hemangioma, hemangiopericytoma, lymphangioma, kaposi sarcoma)*
 - m. xanthomatous tumors (e.g., xanthelasma, juvenile xanthogranuloma)

Management

Technical / surgical skills

Eyelid

1. Perform minor lid and conjunctival procedures (e.g., repair of small eyelid laceration including marginal, removal of eyelid lesions, chalazion curettage or excision, conjunctival biopsy) **
2. Treat complications of minor operating room procedures (e.g., incision and drainage of chalazia, excision of small eyelid lesions) *
3. Describe indications for and perform a temporary tarsorrhaphy **
4. Describe indications for and perform everting sutures (Quickert sutures) **
5. Describe indications for and perform a lateral canthotomy/cantholysis **
6. Describe indications for and complications of, and perform more complicated eyelid surgery (e.g., upper blepharoplasty, lateral tarsal strip) **
7. Perform more complicated lid procedures, including:
 - a. frontalis sling*
 - b. eyelid reconstruction*
8. Describe indications for and complications of, and perform eyelid reconstruction (e.g., wedge/pentagonal block resection) **
9. Identify indications for and complications of, and treat blepharospasm and hemifacial spasm

Lacrimal

1. Describe indications for and perform the basic office examination techniques for the most common lacrimal abnormalities (e.g., Schirmer test, dye disappearance test, punctal position, punctal dilation, canalicular probing, lacrimal probing and irrigation) **
2. Describe indications for and perform an incision and drainage of the lacrimal sac **
3. Describe the indications for and perform punctal cautery *
4. Identify indications for and perform more advanced lacrimal assessment (e.g., interpretation of dye testing, canalicular probing in trauma) **

5. Describe indications for and complications of, and perform lacrimal probing, lacrimal intubation, incision and drainage of lacrimal sac abscess **
6. Describe indications for and perform dacryocystorhinostomy *
7. Perform punctal plug insertion or removal

Orbit

1. Describe indications for and complications of, and perform enucleation and evisceration with primary placement of orbital implant **
2. Describe the management and rehabilitation of an anophthalmic socket
3. Describe indications for and complications of basic orbital skills and procedures, including:
 - a. anterior orbitotomy for tumor biopsy/excision*
 - b. orbital floor fracture repair*
4. Describe indications for and complications of different orbital approaches and incisions (e.g., Kronlein, Caldwell-Luc, transconjunctival, transnasal)

References

Essential reading

1. American Academy of Ophthalmology Basic Clinical Science Course: all volumes, with particular attention to:
 - a. Section 2: Fundamentals and Principles of Ophthalmology
 - b. Section 7: Orbit, Eyelids and Lacrimal System
2. A Manual of Systematic Eyelid Surgery: JRO Collin, 3rd Edition, Butterworth Heinemann 2006

Additional reading

1. Atlas of Clinical and Surgical Orbital Anatomy (Second Edition): Jonathan J Dutton, Saunders, 2011
2. Techniques in ophthalmic plastic surgery : A personal tutorial (with DVD) Nerad JA St Louis: Saunders Elsevier; 2010
3. Colour Atlas of Ophthalmic Plastic Surgery with DVD: Anthony Tyers and JRO Collin; Butterworth Heinenmann, 2008

PEDIATRIC OPHTHALMOLOGY AND STRABISMUS

Pediatric ophthalmology and strabismus are of particular importance in Cambodia, given its young and growing population. Ophthalmologists have the opportunity to make improvements to vision that can have a direct bearing on the educational and economic futures of patients and that will contribute to the well-being of the patient's family and broader community.

Learning outcomes

At the end of the course, residents should be able to:

- Demonstrate understanding of the development of the eye, and the anatomy and physiology of its normal function, in pediatric patients
- Conduct effective examinations of the pediatric patient, including measurement of vision and retinoscopy
- Demonstrate understanding of the assessment and treatment of amblyopia
- Diagnose, plan and conduct treatment of common pediatric ophthalmic conditions, including strabismus, amblyopia, nystagmus, cataract, epiphora, uveitis and ptosis
- Perform accurate evaluation and treatment of strabismus, including use of spectacles, patching and surgical therapy as indicated
- Diagnose and treat cataract, including performance of surgery, pre-operative surgical planning and post-operative follow-up with an emphasis on treatment of amblyopia and detection of post-operative complications such as glaucoma
- Recognise and know how to treat the apparently blind infant
- When dealing with ocular disease of genetic origin, ensure appropriate counselling is provided to the patient and family members
- Work effectively with the patient, parents or carers and, where appropriate, other eye care workers, and the extended family or community to help ensure good treatment outcomes
- Recognise the need for and value of low vision services and make effective referrals as needed

Basic Science

1. Describe basic normal visual development and growth of the eye, including changing eye parameters (corneal curvature, axial length and refraction) critical periods and visual milestones through childhood **
2. Describe the normal developmental milestones of childhood
3. Describe the basic anatomy and physiology of strabismus:
 - innervation of extraocular muscles **
 - primary, secondary, and tertiary actions **
 - laws governing the muscle actions **
 - comitant and incomitant deviations **
 - overaction and underaction **
 - restrictive and paretic saccades *
 - vergence *
 - pursuit movements *
4. Describe basic sensory adaptations for binocular vision, including:
 - normal and anomalous retinal correspondence **
 - suppression **
 - fusion **

- stereopsis **
- 5. Describe the different etiologies of amblyopia, including:
 - deprivation **
 - ametropic **
 - strabismic **
 - anisometropic **
- 6. Describe accommodation **

Clinical Science

Background knowledge

1. Describe the treatment of amblyopia **
 - appropriate glasses **
 - patching **
 - atropine penalization **
 - discourage the use of unproven and costly “amblyopia training” treatments
2. Describe various forms of esotropia, such as:
 - congenital **
 - accommodative and non-accommodative **
 - sensory **
 - restrictive **
 - comitant and incomitant **
 - consecutive **
 - esophoria **
 - monofixation syndrome **
 - nystagmus and esotropia **
 - myogenic*
 - neurogenic *
 - neuromuscular junction*
 - spasm of the near*
3. Describe various forms of exotropia, such as:
 - comitant and incomitant **
 - congenital **
 - convergence insufficiency **
 - exophoria **
 - restrictive **
 - sensory **
 - basic divergence excess*
 - myogenic *
 - neurogenic*
 - neuromuscular junction*
4. Describe refractive errors and spectacle correction in childhood (recognizing that refractive errors are arguably the most common cause of preventable visual impairment in children worldwide) **
5. Describe drugs used for cycloplegia, their mechanisms of action, indications, contraindications, dosing and side-effects **
6. Describe the basics of binocular sensory testing (e.g., Titmus stereo testing, Worth 4-dot test) *
7. Describe different forms of childhood nystagmus *
8. Describe features, classification, basic prevention and treatment indications for retinopathy of prematurity **
9. Describe etiologies and types of pediatric cataract, with consideration of:
 - age of onset **

- when to treat and types of treatment, including the importance of prompt treatment to avoid amblyopia **
 - postoperative rehabilitation, including the critical importance of post op follow-up refraction and patching as needed as well as lifelong follow-up for detection of other complications such as glaucoma **
10. Describe etiologies, evaluation, and management of vertical strabismus, including: *
 - a. neurogenic*
 - b. myogenic*
 - c. neuromuscular junction*
 - d. oblique overaction or underaction*
 - e. dissociated vertical deviation*
 - f. restrictive*
 11. Describe and recognize various strabismus patterns (e.g., A or V pattern) and associations with various types of comitant strabismus *
 12. Describe and recognize common hereditary or congenital ocular motility or lid syndromes (e.g., Duane syndrome, Marcus Gunn jaw-winking syndrome, Brown syndrome) *
 13. Describe and recognize typical features of retinoblastoma (e.g., differential diagnosis, evaluation, treatment indications, and types) **
 14. Describe basic evaluation, differential diagnosis and diseases associated with decreased vision in infants and children (e.g., retinal and optic nerve etiologies, amblyopia) such as:
 - a. delayed maturation of vision **
 - b. retinopathy of prematurity (ROP) **
 - c. congenital glaucoma **
 - d. congenital rubella syndrome **
 - e. Leber congenital amaurosis *
 - f. other hereditary retinal disorders (including albinism, achromatopsia, retinal dystrophy)*
 - g. hereditary disorders of the optic nerve (including optic nerve hypoplasia, congenital optic atrophy)*
 - h. cortical visual impairment and periventricular leukomalacia *
 15. Assess subluxated and dislocated lenses and know the systemic associations (e.g., Marfan syndrome, homocysteinuria, Weill-Marchesani syndrome) *
 16. Describe management of epiphora in children, including congenital nasolacrimal duct obstruction **
 17. Describe the differential diagnosis and management of proptosis, especially orbital cellulitis and rhabdomyosarcoma **
 18. Describe anatomical abnormalities and recognize pathological disorders of the eyelid **
 19. Describe common causes symptoms, signs, diagnosis and treatment of conjunctivitis in neonates and children **
 20. Describe the symptoms, associations, findings, and treatment of childhood glaucoma *
 21. Describe ocular findings in child abuse (e.g., retinal hemorrhages), and understand professional obligations for referral to Child Protective Services or other authorities *

Clinical assessment and management

1. Perform visual assessment of the pediatric ophthalmology patient (e.g., fixation preference tests to determine central, steady, maintained fixation; visual acuity; crowding; using standard vision testing (e.g., tumbling E eye chart and other modalities appropriate for children including Allen cards, preferential looking, etc.) **

2. Perform an extraocular muscle examination based on knowledge of the anatomy and physiology of ocular motility **
3. Assess ocular motility using duction and version testing **
4. Perform basic measurement of strabismus (e.g., cover testing, prism cover testing [most important]; simultaneous prism cover testing, alternate cover testing, Hirschberg test, Krinsky method) **
5. Describe and recognize pseudostrabismus **
6. Perform cycloplegic retinoscopy in children**
7. Perform and accurately interpret autorefraction, including the likelihood of significant instrument accommodation in younger children if cycloplegia is not used*
8. Recognize and apply in a clinical setting the following skills in the ocular motility examination:
 - a. stereoacuity testing **
 - b. accommodative convergence/accommodation ratio *
 - c. tests of binocularity and retinal correspondence*
 - d. cycloplegic refraction (retinoscopy) **
 - e. anterior and posterior segment examination **
9. Perform more advanced strabismus testing, such as Parks-Bielschowsky 3-step test, Maddox rod testing, double Maddox rod testing **
10. Perform forced duction test (FDT) and force generation test (FGT) in the clinic

Technical / surgical skills

1. Probe tear ducts to diagnose and treat an obstruction **
2. Medically and, if indicated, surgically manage chalazions **
3. Intraoperative forced duction test (FDT) **
4. Assist with and perform strabismus surgery, in context of level of advancement in training program and complexity of disease.**
5. Assist with and perform surgery for congenital cataracts, understanding the need for early surgery to prevent amblyopia, decision making around insertion and selection of IOL, and the need for primary capsulotomy/vitrectomy if indicated**

References

Essential reading

1. American Academy of Ophthalmology Basic and Clinical Science Course Section 6: Pediatric Ophthalmology and Strabismus
2. Clinical Ophthalmology: A Systematic Approach: Expert Consult, 7th edition Jack J. Kanski and Brad Bowling

Additional reading

1. Taylor and Hoyt: Pediatric Ophthalmology. Saunders Ltd. 2004. Available in print and Kindle versions
2. Wright, Spiegel and Thompson: Handbook of Pediatric Eye and Systemic disease. Springer.

Free Textbooks Available at Orbis: www.cybersight.org

1. von Noorden and Campos: Binocular Vision and Ocular Motility
2. Helveston: Surgical Management of Strabismus
3. Von Noorden and Helveston: Strabismus: A Decision Making Approach

Pediatric Ophthalmology and Strabismus Journals

1. Journal of AAPOS
2. Journal of Pediatric Ophthalmology and Strabismus

Basic Examination Techniques for Children and Adults with Strabismus

1. Thompson JT, Guyton DL. Ophthalmic prisms. Measurement errors and how to minimize them. *Ophthalmol* 1983, 90 (3): 204-210.
2. Helveston EM. Prism placement. Measurements of horizontal and vertical deviations with the head tilted. *Arch Ophthalmol*. 1975; 93: 483-486.
3. Thompson JT, Guyton DL. Ophthalmic prisms. Deviant behavior at near. *Ophthalmol* 1985; 92(5): 684-690.
4. Scattergood KD, Brown MH, Guyton DL. Artifacts introduced by spectacle lenses in the measurement of strabismic deviations. *Am J Ophthalmol* 1983; 96 (4): 439-448

RETINA AND VITREOUS

A thorough understanding of the anatomy and pathophysiology of the retina is essential for an ophthalmologist. The incidence of diabetic retinopathy is emerging as a leading cause of blindness and visual impairment worldwide and is likely to increase in Cambodia. Timely detection and treatment can prevent visual impairment; thorough knowledge of diabetic eye disease is critical. Both the immediate threat posed by trauma and the risks associated other systemic disease also threaten sight. Expertise in interpretation and treatment planning on the basis of direct and ancillary test results will be developed with sustained and reflective practice.

Learning Outcomes

At the end of the course, residents should be able to:

- Describe the basic structure and function of the retina and its relationship to the vitreous and choroid; and, understand the pathological and aging process that affect the retina and vitreous
- Examine the retina and vitreous including the use of indirect ophthalmoscope and slitlamp biomicroscopy with appropriate lenses
- Interpret and use the results of ancillary studies for evaluation and management of retinal and vitreous disease (these may include colour fundus photography, B scan ultrasound, OCT, fundus fluorescein angiography)
- Recognise and manage diabetic retinopathy and perform retinal laser treatment under appropriate circumstances
- Recognise and treat other common retinal and vitreous disorders
- Apply findings from prospective clinical trials to the management of selected retinal and vitreous disorders
- Use the following techniques appropriately:
 - laser photocoagulation of the retina
 - intravitreal agents, demonstrating knowledge of basic principles, techniques and safety of intravitreal injections
- Manage common retinal and vitreous disorders

Basic Science

1. Describe basic principles of retinal anatomy and physiology **
2. Describe the principles of ancillary testing and demonstrate basic understanding of fluorescein angiography (angiographic phases) *
3. Describe basic principles of lasers, laser safety and their use in treatment of retinal (e.g., laser response to change in power, duration, and spot size) for retinal treatment **
4. Describe the fundamentals of retinal electrophysiology
5. Describe the fundamentals of ultrasound and its uses in ophthalmology, with emphasis on B scan ultrasonography in the assessment of retinal disease **

Clinical Science

Background knowledge

1. Describe pathological anatomy, pathophysiology, and clinical features of **diabetic retinopathy****
2. Describe the pathological anatomy, pathophysiology and clinical features of other **retinal vascular** disorders including:
 - central retinal vein occlusion (CRVO) **

- branch retinal vein occlusion (BRVO) **
 - arterial occlusion (central and branch)**
 - hypertensive retinopathy **
3. Describe features of different types of **retinal detachment** (i.e., rhegmatogenous, tractional, exudative) **
 4. Describe typical features of common **macular diseases** (e.g., age-related macular degeneration [AMD], macular hole, macular pucker, central serous chorioretinopathy, chloroquine maculopathy, quinine toxicity, pseudophakic cystoid macular edema). **
 5. Describe and recognize features of **traumatic pathologies**, including:
 - a. commotio retinae **
 - b. traumatic choroidal rupture **
 - c. Purtscher retinopathy*
 6. Describe the findings of major studies in vascular retinal diseases, including the following:
 - i. Diabetic retinopathy **
 - Diabetic Retinopathy Study (DRS) **
 - Early Treatment Diabetic Retinopathy Study (ETDRS) **
 - Diabetes Control and Complications Trial (DCCT) **
 - Diabetic Retinopathy Vitrectomy Study (DRVS) *
 - ii. Central vein occlusion **
 - Central Vein Occlusion Study (CVOS)
 - Central Retinal Vein Occlusion (CRUISE) Study
 - iii. Branch vein occlusion **
 - Branch Vein Occlusion Study (BVOS)
 - Branch Retinal Vein Occlusion (BRAVO) Trial
 - iv. Retinopathy of prematurity **
 - Cryotherapy for retinopathy of prematurity(CRYO-ROP)
 - Early Treatment for retinopathy of prematurity (ETROP)
 7. Describe typical features of retinitis pigmentosa **, main macular dystrophies (e.g., Stargardt, Best, cone dystrophy), and other hereditary pathologies.

Clinical assessment and management

1. Take a comprehensive clinical history with an emphasis on retinal disease and its risk factors **
2. Perform slit-lamp biomicroscopy including use of precorneal lenses, 3-mirror contact lenses, or other wide-field contact lenses **
3. Perform direct ophthalmoscopy. *
4. Perform indirect ophthalmoscopy with scleral indentation **
5. Recognise the signs of non-proliferative and proliferative diabetic retinopathy and diabetic macular edema, based on results of fundus examination and fundus photographs **
6. Recognise the signs of other common retinal disorders such as cystoid macular edema, central serous retinopathy and exudative age related macular degeneration, based on results of fundus examination and fundus photographs **
7. Interpret basic echographic patterns (e.g., rhegmatogenous retinal detachment, tractional retinal detachment, posterior vitreous detachment, choroidal detachment, intraocular foreign body) **
8. Perform fundus drawings of the retina, showing vitreoretinal relationships and findings **
9. Diagnose, evaluate, and treat (or refer) *endophthalmitis* **
10. Describe the fundamentals of, evaluate, and treat (or refer) *peripheral retinal diseases* and vitreous pathologies (e.g., vitreous hemorrhage, posterior

vitreous detachment, retinal tears, giant retinal tears, lattice degeneration with atrophic holes) **

11. Evaluate, treat, or refer *retinal vascular diseases*:
 - diabetic retinopathy**
 - arterial and venous obstructions**
 - hypertensive retinopathy**
 - peripheral retinal vascular occlusive disease*
 - macular telangiectasia *
 - Coats disease **
 - acquired retinal macroaneurysms **
 - ocular ischemic syndrome **
 - sickle cell retinopathy **
 - Eales Disease **
12. Describe and recognize typical features of less common *macular diseases*:
 - myopic maculopathy*
 - serous retinal detachment secondary to optic disc pit*
 - ocular histoplasmosis syndrome
 - drug toxicities *
13. Diagnose, evaluate, treat, and classify open and closed globe trauma **
14. Describe, evaluate, and treat (or refer) postoperative/posttraumatic choroidal detachments and sympathetic ophthalmia **
15. Describe, recognize, and evaluate hereditary pathologies, such as juvenile retinoschisis and choroidal dystrophies (e.g., choroideremia, gyrate atrophy)*
16. Interpret fluorescein and angiography and correlate findings with differential diagnosis.
17. Evaluate and diagnose complex cases of retinal detachment (e.g., acute retinal necrosis, proliferative vitreoretinopathy) *
18. Diagnose and classify and know how to prevent retinopathy of prematurity **
19. Diagnose and manage (or refer) complex trauma cases (e.g., intraocular foreign body) *
20. Diagnose hereditary vitreoretinal degenerations (e.g., Stickler syndrome, Wagner syndrome, Goldmann-Favre degeneration)

Technical / surgical skills

1. Describe basic principles, techniques, and safety of intravitreal injections **
2. Perform vitreous tap and intravitreal antibiotic injections for the treatment of endophthalmitis **
3. Describe the indications/complications for and perform basic laser treatment for diabetic retinopathy (e.g., panretinal photocoagulation, macular grid) **
4. Perform posterior segment photocoagulation: **
 - diabetic focal/grid macular treatment (e.g., monocular patient, repeat treatment) **
 - peripheral scatter photocoagulation (panretinal) **
 - laser retinopexy (demarcation) of large or multiple breaks; cryotherapy **
5. Perform laser therapy or cryotherapy of retinal holes **
6. Describe the techniques for retinal detachment repair, including indications, mechanics, instruments, basic techniques, and surgical adjuvants, including heavy liquids, expandable gases, and silicone oil for the following:
 - pneumatic retinopexy **
 - scleral buckling **
 - vitrectomy **
7. Perform subTenon injections of triamcinolone acetonide for the treatment of macular edema **
8. Assist with and perform scleral buckling and pars plana vitrectomy surgeries *

9. Perform intravitreal injection of anti-vascular endothelial growth factor (VEGF) drugs for the treatment of AMD

References

Essential reading

1. American Academy of Ophthalmology Basic Clinical Science Course: all volumes, with particular attention to:
Section 1: Update on General Medicine
Section 2: Fundamentals and Principles of Ophthalmology
Section 12: Retina and Vitreous
2. Jack J. Kanski and Brad Bowling, Clinical Ophthalmology: A Systematic Approach: Expert Consult, 7th edition
3. Guidelines for the Management of Diabetic Retinopathy for Implementation in Low Resource Settings, Centre for Eye Research Australia, 2013 (note – to be provided in pdf form as part of learning resources)
4. International Council of Ophthalmology Guidelines for Diabetic Eye Care: download at:
http://www.icoph.org/enhancing_eyecare/international_clinical_guidelines.html

Additional reading

1. Yannuzzi LA: The Retinal Atlas. Saunders Elsevier 2010 (online access once purchased)
2. Ryan, SJ (ed): Retina Vol 1-3 St Louis: Mosby (online access once purchased)
3. Diabetic Retinopathy Clinical Research Network (DRCRnet):
<http://drcrnet.jaeb.org/Publications.aspx>

UVEITIS AND OCULAR INFLAMMATION

An ophthalmologist needs the knowledge and skills to formulate a treatment plan and manage a patient with ocular inflammatory symptoms and signs. As ocular inflammation is a potentially blinding condition, generally affecting a younger age group, it is important to be able to recognise ocular inflammation, its causes and its associated systemic diseases, some of which can be life-threatening.

Learning Outcomes

At the end of the course, residents should be able to:

- Demonstrate an understanding of the pathophysiology of ocular inflammation
- Demonstrate an understanding of the causes of ocular inflammation
- Document an ocular history relevant to ocular inflammatory conditions
- Perform eye examinations for ocular inflammatory conditions
- Conduct diagnosis and investigation of ocular inflammation
- Implement a management plan for ocular inflammatory disorders

Basic Science

Describe the pathophysiology of intraocular inflammation, including:

1. Principles of general immunology
 - types of immunity **
 - cells of the immune system **
 - antigens and antibodies **
 - the complement system *
 - intercellular adhesion molecules *
 - monoclonal antibodies *
2. Mechanisms of immunoreactivity **
 - cellular interaction in the immune response **
 - generation of the immune response **
 - regulation of the immune response **
3. Hypersensitivity reactions
 - mechanism of cell and tissue damage **
 - types of hypersensitivity reactions i-v **
4. The ocular immune response
 - tear, conjunctiva, cornea, anterior chamber, lens, uveal tract, and retina **

Clinical Science

Background knowledge

1. Describe the definition and classification of intraocular inflammation **
2. List the clinical features and differential diagnosis of:
 - i. non-infectious (autoimmune) ocular inflammatory disease **
 - non-infectious scleritis **
 - anterior uveitis **
 - intermediate uveitis **
 - posterior uveitis **
 - neuroretinitis
 - panuveitis:
 - sarcoidosis **

- sympathetic ophthalmia **
- Vogt-Koyanagi-Harada syndrome **
- Behçet disease **
- ii. infectious Ocular inflammatory Disease
 - viral uveitis **
 - fungal uveitis **
 - protozoal uveitis **
 - helminthic uveitis *
 - bacterial uveitis **
 - infectious scleritis **
- iii. endophthalmitis **
- iv. masquerade syndromes **
- 3. Describe and diagnose complications of uveitis:
 - i. band keratopathy **
 - ii. cataract **
 - iii. glaucoma **
 - iv. hypotony **
 - v. cystoid macular edema **
 - vi. vitreous opacification and vitritis **
 - vii. retinal detachment **
 - viii. retinal and choroidal neovascularization **
- 4. Describe the ocular manifestations of AIDS **
 - i. ocular manifestations
 - ii. external eye manifestations
- 5. Describe indications for ancillary testing in the evaluation of uveitis (e.g. fluorescein angiography [FA]*, optical coherence tomography [OCT] *, B-scan ultrasonography **)
- 6. Describe indications for a tailored approach (based on clinical features) to laboratory investigations, including obtaining tissue and fluid samples for examination and systemic imaging studies (e.g. x-ray of chest, sacroiliac joint, chest computerized axial tomography [CT or CAT] scan) **
- 7. Describe the indications, contraindications and use of topical steroids, nonsteroidal anti-inflammatory drugs (NSAIDs), and cycloplegics **

Clinical assessment

1. Take a history with emphasis on points relevant to patients with uveitis:
 - a. ocular history
 - i. correlate with possible anatomical diagnosis (e.g., photophobia and anterior uveitis; floaters and posterior uveitis) **
 - ii. describe the onset (sudden or insidious) **
 - iii. describe the duration (limited or persistent) **
 - iv. describe the course (acute, recurrent, chronic) **
 - b. investigation and treatment history **
 - c. systemic history
 - i. known diseases, including immunosuppressed states, such as HIV, malignancy, diabetes mellitus and systemic infectious and non-infectious inflammatory diseases **
 - ii. symptoms of recent onset for (e.g. fever, chills, and rigors may suggest sepsis) **
 - iii. systems review, including all medications, past and current **
2. Perform slit-lamp examination of the anterior segment to detect and evaluate clinical features of uveitis, including:
 - a. differentiate episcleritis from scleritis **

- b. corneal pathology (active keratitis or scars, endotheliitis, band keratopathy) **
 - c. pattern of keratic precipitates (nongranulomatous, granulomatous) **
 - d. iris changes (rubeosis iridis, gross iris atrophy iris nodules, pupillary membrane, peripheral anterior synechiae, iris bombe) **
 - e. anterior chamber evaluation of cells and flare, including grading according to standardization of uveitis nomenclature (sun) working group grading system **
 - f. lens evaluation**
 - g. describe the activity (active or quiescent) **
3. Perform dilated examination of the posterior segment with slit-lamp biomicroscopy using noncontact and contact lenses, and indirect ophthalmoscopy with scleral indentation **
 - a. Vitreous evaluation for cells and flare, including grading of vitreous haze according to SUN working group grading system, presence of a vitreous or pars plana snowbank **
 - b. Retina: retinitis (diffuse or focal), choroiditis, retinal detachment, vasculitis, neovascularisation
 - c. Optic disc pallor or swelling **
 4. Recognise serious infective causes from noninfective causes of uveitis **
 5. Recognise specific uveitic conditions
 6. Interpret fluorescein angiography, B-scan ultrasonography and ocular coherence tomography (OCT), and correlate clinically
 7. Formulate a differential diagnosis based on the history, examination and special investigations.
 8. Perform investigational work up (e.g. laboratory testing, radiologic testing, tissue and ocular samples) according to epidemiologic data, history, and clinical examination to identify important and treatable causes of uveitis and systemic manifestations.*
 9. Provide patient with all relevant information about proposed ancillary testing procedures for uveitis, including risks and complications. *

Management

Medical management

1. Formulate a diagnosis and appropriate management plan**
2. Administer topical steroids, NSAIDs, and cycloplegics in the treatment of uveitis **
3. Manage common ocular complications of inflammation and/or its treatment e.g. raised intraocular pressure**
4. Administer oral corticosteroids in the treatment of uveitis.*
5. Consider the use of steroid-sparing and immunosuppressive agents
6. Consider the use of vitrectomy
7. Provide patient with relevant information about possible side effects of medications and proper monitoring of medications **
8. Identify and manage side effects of immunosuppressive therapy, collaborating with other specialists (e.g. Rheumatologists) as indicated **

Technical / surgical skills

1. Administer periocular corticosteroid injection of corticosteroids e.g. subTenon, orbital floor)*
2. Perform an anterior chamber and vitreous tap for diagnostic purposes and administer intravitreal injection antibiotics in cases of endophthalmitis **

References

Essential reading

3. Basic and Clinical Science Course. Section 8: External Disease and Cornea. San Francisco: American Academy of Ophthalmology.
4. Clinical Ophthalmology: A Systematic Approach: Expert Consult, 7th edition Jack J. Kanski and Brad Bowling

Additional reading

1. Jabs DA, Nussenblatt RB, Rosenbaum JT; Standardization of Uveitis Nomenclature (SUN) Working Group. Standardization of uveitis nomenclature for reporting clinical data. Results of the First International Workshop. Am J Ophthalmol. 2005 Sep;140(3):509-16
2. Herbort CP. Appraisal, work-up and diagnosis of anterior uveitis: a practical approach. Middle East Afr J Ophthalmol. 2009 Oct; 16(4):159-67.
3. Herpetic Eye disease Study Group. Acyclovir for the prevention of recurrent herpes simplex virus eye disease. N Engl J Med 1998; 339:300-306.

ETHICS AND PROFESSIONALISM IN OPHTHALMOLOGY

Ethics are rules or standards that define the values, determine the responsibilities, and describe the conduct of members of a profession. Medical professionals are expected to practice ethically at all times, with the patient's interests at the centre of all decision-making.

Learning Outcomes

At the end of the course, residents should be able to:

- Demonstrate understanding of the ethical responsibilities of the practicing ophthalmologist
- Demonstrate understanding of the legal responsibilities of the practicing ophthalmologist

Knowledge and skills

1. Provide the definition and basic concepts behind the following terms used in medical ethics:
 - morality versus ethics (intent-based standards versus conduct-based standards)
 - autonomy and surrogacy
 - beneficence
 - non-maleficence
 - truth telling
 - distributive justice
 - fiduciary responsibility to patients
 - compassion
2. Describe the ethical principles listed in the following key medical documents:
 - Hippocratic Oath¹ **
 - Declaration of Geneva² **
 - Ethical Code, International Council of Ophthalmology³ **
 - Khmer Medical Oath⁴ **
 - Code of Ethics, American Academy of Ophthalmology⁵
3. Describe the basics of the health care system and reimbursement for services as appropriate to the local, regional, and national market of Cambodia **
4. Describe basic medical ethics in the ophthalmic practice, including:
 - confidentiality of health information **
 - professional competence and maintenance of competence **
 - informed consent **
 - responsibility to report the unethical conduct of others **
 - adequate patient assessment and avoidance of under/over treatment and under/over testing **
5. Identify elements of effective physician-patient communication, including relevant cultural and linguistic differences that potentially influence ethical delivery of services **
6. Understand and apply principles of disability inclusive development *
7. Describe the framework of patient-care quality as it relates to patient safety, patient advocacy, effectiveness, efficiency, timeliness, and equity **
8. Describe how ophthalmologists are responsible for ensuring that all those in the service area of the practice have access to affordable eye care, and define how ophthalmologists are uniquely trained and certified to do so **

9. Identify the various missions of ophthalmology organizations with respect to service to members, patients, clinical education, and quality of care. Define and mitigate the consequences of conflicting missions **
10. Identify how participation of ophthalmologists in ophthalmology organizations serves the profession and society **
11. Identify the responsibilities of ophthalmologists and ophthalmology societies to ensure that everyone has the right to sight **
12. Recognize and use medical ethics in the ophthalmic practice:
 - applicable informed consent documents (e.g., clinical research, off-label use disclosures) *
 - management (offering and rendering) of second opinions *
 - individual and institutional responsibilities regarding impaired physicians
 - responsibility for postoperative care, including appropriate transfer of care to other physicians **
 - appropriate delegation to other eye care professionals and members of the health care team **
 - fairness of fees
 - management of conflicts of interest (clinical and nonclinical) **
 - disclosures
 - gifts to physicians**
 - appropriate advertising (and applicable laws) *
 - appropriate conduct as a medical-expert witness in litigation
13. Describe the ethical principles listed in the following key medical documents regarding research involving human subjects:
 - Nuremberg Code⁵ **
 - Declaration of Helsinki⁶ **
 - Belmont Report⁷ *
14. Work within integrated eye care delivery systems (both within eye care specialties and within general medicine and surgery) **
15. Participate in all of the foregoing aspects of practice management to the best ability within a medical education setting *
16. Utilize all of the foregoing ethical principles and knowledge in direct patient care **
17. Describe the responsibility of ophthalmologists to share their knowledge of clinical arts and sciences for the benefit of patients, the profession, and society **

References

Essential reading

1. Hippocratic Oath
http://www.nlm.nih.gov/hmd/greek/greek_oath.html
2. Declaration of Geneva, World Medical Association
<http://www.wma.net/en/30publications/10policies/q1/>
3. Ethical Code, International Council of Ophthalmology
www.icoph.org/pdf/icoethicalcode.pdf
4. Khmer Medical Oath
5. Code of Ethics, American Academy of Ophthalmology
http://www.aaopt.org/about/ethics/code_ethics.cfm
6. Nuremberg Code
<http://ohsr.od.nih.gov/guidelines/nuremberg.html>
7. Declaration of Helsinki, World Medical Association
<http://www.wma.net/en/30publications/10policies/b3/>
8. Belmont Report
<http://www.hhs.gov/ohrp/humansubjects/guidance/belmont.html>

9. Inclusion Made Easy: A quick program guide to disability in development
CBM
<http://www.cbm.org/Inclusion-Made-Easy-329091.php>

Additional Reading

1. Angell, M. The Truth About Drug Companies, How They Deceive Us and What to Do About It. New York, Random House, 2005
2. Gawande A. Better: A Surgeon's Notes on Performance. New York. Metropolitan Books, 2010
3. Harbin T. Waking up Blind - Lawsuits over Eye Surgery. Minneapolis, Langdon Street Press 2009
4. Kassirer J. On The Take: How Medicine's Complicity with Big Business Can Endanger Your Health. New York, Oxford University Press, 2004

COMMUNITY EYE HEALTH

Mastery of the knowledge and skills described in this standard prepares residents for the practice of Public Health Ophthalmology in the Cambodian context.

Learning objectives

At the end of the course, residents should be able to:

- Describe the fundamental concepts of Public Health Ophthalmology
- Describe the application of these concepts to ophthalmology in Cambodia

Public Health Ophthalmology

- Describe the leading causes of blindness and vision impairment globally, regionally and in Cambodia, and the barriers to eradicating these **
- Describe and engage with the organizations (e.g. World Health Organization, International Agency for the Prevention of Blindness, international nongovernment development organizations), programs (particularly “Vision 2020—The Right to Sight”) and projects concerned with the elimination of blindness and vision impairment, working globally, regionally and in Cambodia **
- Describe the concepts, rationale and practicalities of the “national blindness prevention plan” for Cambodia**
- Participate in the implementation, monitoring, evaluation and revision of the “national blindness prevention plan” for Cambodia *
- Describe concepts fundamental to the planning, organization and running of effective and efficient public clinic, surgical and community outreach services, including:
 - a. needs assessment.
 - b. situation analysis.
 - c. priority setting.
 - d. policy and legislation.
 - e. service planning.
 - f. budgeting.
 - g. community and patient education and mobilization.
 - h. resource mobilization and allocation.
 - i. human resource management.
 - j. equipment acquisition.
 - k. stock purchase.
 - l. inventory control.
 - m. record keeping.
 - n. infrastructure.
 - o. maintenance and repair.
 - p. service pricing and cross-subsidization.
 - q. financial control and accountability.
 - r. standards setting.
 - s. guidelines, protocols, standard operating procedures (SOPs).
 - t. service monitoring.
 - u. quality assurance and continuous improvement.
 - v. clinical audit.
 - w. service evaluation.
 - x. activity and financial reporting.
 - y. continuing professional development.
 - z. advocacy *.

- Describe and participate in the planning, organization, implementation, monitoring and evaluation of effective and efficient public clinic, surgical and community outreach services *
- Describe the contribution an ophthalmologist can make, particularly with respect to the ophthalmic content, as a lecturer, tutor, supervisor and/or mentor, in the primary education and/or continuing professional development of undergraduate medical and nursing students, doctors and nurses, and/or those undertaking postgraduate ophthalmic specialist medical and nursing qualifications and/or work **
- Participate, particularly with respect to the ophthalmic content, as a lecturer, tutor, supervisor and/or mentor, in the primary education and/or continuing professional development of undergraduate medical and nursing students, doctors and nurses, and/or those undertaking postgraduate ophthalmic specialist medical and nursing qualifications and/or work **
- Describe the aims, membership criteria, obligations and activities of regional and national Cambodian medical and ophthalmology professional organizations *
- Describe the uses and operation of computer software appropriate to the practice of ophthalmology (e.g. word processing, spreadsheet, data analysis and statistics, internet and email, literature search, presentation) **
- Use computer software appropriate to the practice of ophthalmology (e.g. word processing, spreadsheet, data analysis and statistics, internet and email, literature search, presentation)*
- Describe the basics of ophthalmic private practice management (e.g. business models, licensing and credentialing, contractual negotiations, hiring and supervising employees, financial management, working with associates, billing/collecting, medical documentation, privacy requirements, third party payers, managed care, private insurance)

Research in Ophthalmology

An introduction to the practice of research is designed to encourage engagement with the wider ophthalmic community. It will help develop reflective practice and enable the creation of new knowledge that, arising from the local context, might have particular significance for ophthalmic practice in Cambodia.

Learning Objectives

At the end of the course, the residents should be able to:

- Develop a creative, critical approach, creativity and research-oriented attitude in professional activities
- Acquire and evaluate new relevant scientific data and information and integrate this into the knowledge required for practice in ophthalmology
- Use scientific thinking and evidence to in clinical decision making
- Formulate hypotheses, evaluate data, and apply new knowledge to the analysis and solution of problems
- Present the findings of an original piece of research at a scientific meeting
- Publish a paper in a scientific journal

Learning Experiences

1. Plan and design a research project **
2. Write a research proposal **
3. Collect data *

4. Analyzeresearchdata *
5. Reportresultsoftheresearch *
6. Presentand/orpublishtheresearcharticle **

References

Essential reading

- 1 VISION2020: the right to sight Global initiative for the elimination of blindness Action plan 2006-11 [Available from: http://www.who.int/entity/blindness/ACTION_PLAN_WHA62-1-English.pdf]
- 2 WHOVISION 2020 GlobalInitiativeDocument 1997 [Available from: <http://vision2020.org/documentHandler.cfm?dld=1323&pflag=docm93jijm4n1323>]
- 3 WHOBulletin 82 pp844-851 GlobalDataonVisuallImpairment [Available from: http://v2020.nemisys2.uk.com/core/core_picker/download.asp?documenttable=libraryfiles&id=1037]
- 4 VISION 2020 GovernmentToolKit [Available from: <http://www.vision2020.org/main.cfm?type=V2020TK>]
- 5 Guidelines for Diagnosis and Management of Diabetic Retinopathy in Cambodia (currently being developed as part of National Strategic Plan for Blindness Prevention and Control 2008- 2015 (NPEH / CERA)
7. Asia Pacific Glaucoma Society Guidelines <http://www.apglaucomasociety.org/content/view/457/>
8. National Strategic Plan for Blindness Prevention and Control : Kingdom of Cambodia Ministry of Health and National Program for Eye Health
9. American Academy of Ophthalmology BCSC Volume 1: Using Statistics in Practice and Work

Additional reading

1. Eye Care in Developing Nations: Larry Schwab, 4th Edition 2007, Manson Publishing

ASSESSMENT

The program adopts formative and summative approaches to generate feedback for evaluation regularly and transparently throughout the 4 years of study. The assessment strategies help students consolidate knowledge, skills and experiences gained. Students are evaluated during theoretical training, clinical practicum and scientific training.

ASSESSMENT ON THEORETICAL TRAINING

Formative Evaluation

Students receive regular formative evaluation with feedback after each module. Assessment methods includes various tools such as QCM, Short answers, clinical cases, critical reading article, pre and post tests and other approaches as indicated by the teacher. The purpose is to stimulate self-assessment, self-reflection, promote interactive learning atmosphere among classmates and to learn and work together as a team.

Summative Evaluation

Students are evaluated by a test at the end of each module. Evaluation methods combine QCMs, Shot answers and clinical cases. The test will include comprehensive questions that cover all items taught (blue print) to achieve all learning objectives of the course.

Students have to pass all modules before going into the final year of internship. In case one fails, he has to retake the module organized at the end of the academic year.

ASSESSMENT ON CLINICAL PRACTICE

Formative Assessment

Students receive regular formative evaluation with feedback during internships and clinical seminars. This assessment structured by various teaching methods and tools such as One-min preceptor, 5steps Micro-skills, competency checklists, rating scales and etc. Students are evaluated by clinical mentors, hospital simulation room and among themselves, as a form of peer-assisted learning.

Summative Assessment

Students are assessed at the end of every clerkship. The assessment includes:

Evaluation of skills, activities and technical procedures via the course book, portfolio and / or logbook indicating the number, nature and mastery acquired activities and procedures.

Evaluation of participation in clinical seminars: via the logbook and oral presentations by a rubric used by teachers and clinical instructors.

The Faculty of Medicine, in conjunction with the Directors of Residency Training and the Technical Boards of University Hospitals reserves the right to conduct additional evaluations of assessment tools, such as Objective Structured Clinical Examination, Mini-CEX, other competency checklists and multi-skill assessments.

Students must pass all assessments before proceeding to next internship. In case of failing in any subjects (although passing the theoretical modules), that student must repeat that internship.

ASSESSMENT ON SCIENTIFIC TRAINING

Formative Assessment

Students receive regular formative evaluation with feedback in each seminar of thesis preparation. A checklist will be used in correspondence to the educational objectives of the seminar.

Summative Evaluation

All students are assessed during the 2nd seminar thesis preparation at the end of each academic year by University Hospital jury teachers proposed by the Dean. The panel uses a checklist in accordance with the objectives of the year; quality criteria for theses and UHS to generate feedback. For further information, students can review Guidelines for writing thesis to the UHS.

If students fail this course, they have to retake this course (despite getting pass in both theoretical and practical modules). A second session will be organized at the end of the academic year.

THESIS

The thesis is the clinical research conducted by the student under the supervision of an authorized teacher at the University of Health Sciences of Cambodia. It corresponds to 12 credits and must be completed within 6 years since one's first registration. Before initiating the research study, the topic must be approved by the head of the discipline and evaluated at a public defense by a jury appointed by the Rector. The draft and presentation must always conform to the rules by the University of Health Sciences of Cambodia.

GRADUATION

Students must obtain validated credits from ALL concentrations below within 5 years after their first registration:

- i) Theoretical training;
- ii) Practical training;
- iii) Scientific training, including the thesis.

Graduates from the " Ophthalmology Residency Training " will be awarded a certificate and a diploma with completed thesis as requirement: Medical Specialist in Ophthalmology.

QUALIFICATION

Upon reaching the required competencies and have successfully taken the national exam, the candidate will be eligible to be awarded Diploma of Specialized Studies in Ophthalmology'.

In order to sustain the knowledge ophthalmologist, the program will conduct regular workshop (CME) to monitor, evaluate and supervise them and also to make sure that the knowledge they have acquired is still usable and updated.

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 - b. Section 3: Clinical Optics
 - c. Section 11: Lens and Cataract
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