

WEST AFRICAN COLLEGE OF SURGEONS

FACULTY OF OPHTHALMOLOGY

TRAINING CURRICULUM FOR THE

MEMBERSHIP AND FELLOWSHIP PROGRAMME

THE MEMBERSHIP PROGRAMME

This will commence in October 2014.

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PREAMBLE

Globally, and particularly in sub Saharan Africa, there is a crisis in human resources for health of all cadres.¹

Ophthalmologist per million population in sub-Saharan Africa ranges between 1 to 3.1 compared to 79 in developed countries.²

The world's population is ageing which is a major risk factor for blinding diseases³. To meet these challenges through the production of a middle level health specialist manpower for the countries of the West Africa sub region, the West African College of Surgeons (WACS) requested its faculties to develop the membership cadre and its relevant curriculum.

The Faculty of ophthalmology had successfully over the last eighteen years through the two- year diploma in ophthalmology programme, produced over two hundred diplomates who have been sole providers of eye care services in Sierra Leone and Liberia and most of the cataract surgical services in many of the Anglophone countries of the sub-region. In Francophone countries, the Diploma in ophthalmology template was also used for the design of the Diplome d'Études Supérieures Spécialisées d'Ophtalmologie (DESSO) programme whose graduates are accepted into the CES programme; a two stage training approach.

The faculty, in the development of the membership component of this curriculum, has therefore drawn on these prior experiences, the wider global ophthalmology training direction and resources and responded to the directives of the WACS Council.

In addition, the faculty has placed increased emphasis on a high quality surgical competence in order to adequately and primarily address cataract, the region's leading cause of blindness.

In order to maximally utilise the existing training opportunities and resources and provide a wide and varied exposure to residents, the curriculum recommends the concept of a network of training facilities, made up of teaching hospitals, high volume centres, other service delivery centres and practical experiences in Primary health care and community health services.

Since the membership is an exit step, the anticipated increase in numbers produced and their equitable distribution will meet the needs of the population of the sub region.

¹ Chen et al The Lancet vol 364 Issue 9449 doi:10.1016/S0140-6736(04)17482-5

² Resnikoff S., Felch W., Gauthier T-M., *Br J Ophthalmol* -2011-301378

³ Resnikoff S, Pascolini D., Etya'ale D., et al, Global data on visual impairment in the year 2002 *Bull World Organisation* 2004, 82: 844-51

A.MISSION STATEMENT

Based on a human rights and equity approach to health and the development of human resources for health for universal coverage in West Africa, our mission is to produce a comprehensive Ophthalmologist as the leader of the eye care team who will deliver population and patient centred high quality comprehensive integrated eye care services.

B. OUTCOME OBJECTIVES OF THE MEMBERSHIP PROGRAMME

1. To produce a specialist that can deliver ophthalmic care in response to our population needs.
2. To produce a specialist in Ophthalmology with the requisite amount of knowledge, skills and attitudes, who is capable of independent specialist practice.
3. He/she should be able to contribute to his specialty through publications and is also expected to participate in the training of all other eye care workers at all levels under him/her.
4. Such a specialist at the end of his training should be capable of critically reviewing new development and research findings in science and medicine as they apply to ophthalmology and the delivery of eye health services.

C.CORE COMPETENCIES

Core competencies and sub-competencies are the driving force of the training programme

In addition to the specialized cognitive and technical skills described in this curriculum, several generic core “competencies” are expected of ophthalmic, as well as other medical specialists.

These general core competencies include the following:

- C.1 Patient care
- C.2 Medical knowledge
- C.3 Practice-based learning and improvement
- C.4 Interpersonal and communication skills
- C.5 Professionalism
- C.6 Systems-based practice
- C.7 Surgical skills
- C.8 Population – based care

C.1 Patient Care

Trainees (“residents”) must be able to provide patient care that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health. Residents are expected to:

- a. Communicate effectively and demonstrate caring and respectful behaviours when interacting with patients and their families
- b. Gather essential and accurate information about their patients
- c. Make informed decisions about diagnostic and therapeutic interventions, based on patient information and preferences, up-to-date scientific evidence, and clinical judgment
- d. Develop and carry out patient management plans

- e. Counsel and educate patients and their families
- f. Use information technology to support patient care decisions and patient education
- g. Perform competently the medical and invasive procedures considered essential for the area of practice
- h. Provide health care services aimed at preventing health problems or maintaining health;
- i. Work with health care professionals, including those from other disciplines, to provide patient-focused care.

C.2 Medical Knowledge

Residents must demonstrate knowledge about established and evolving biomedical, clinical, and cognate (e.g. epidemiological and social-behavioural) sciences and the application of this knowledge to patient care. Residents are expected to:

- a. Demonstrate an investigatory and analytic thinking approach to clinical situations;
- b. Know and apply the basic and clinically supportive sciences which are appropriate to ophthalmology

C.3 Practice-based Learning and Improvement

Residents must be able to investigate and evaluate their patient care practices, appraise and assimilate scientific evidence, and improve their patient care practices. Residents are expected to:

- a. Analyze practice experience and perform practice-based improvement activities using a systematic methodology
- b. Locate, appraise, and assimilate evidence from scientific studies related to their patients' health problems
- c. Obtain and use information about their own population of patients and the larger population from which their patients are drawn
- d. Apply knowledge of study designs and statistical methods to the appraisal of clinical studies and other information on diagnostic and therapeutic effectiveness
- e. Use information technology to manage information, access on-line medical information; and support their own education
- f. Facilitate the learning of students and other health care professionals.

C.4 Interpersonal and Communication Skills

Residents must be able to demonstrate interpersonal and communication skills that result in effective information exchange and teaming with patients, patients' families, and professional associates. Residents are expected to:

- a. Create and sustain a therapeutic and ethically sound relationship with patients
- b. Use effective listening skills and elicit and provide information using effective nonverbal, explanatory, questioning, and writing skills
- c. Work effectively with others as a member or leader of a health care team or other professional groups.

C.5 Professionalism

Residents must demonstrate a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient population. Residents are expected to:

- a. Demonstrate respect, compassion, and integrity; a responsiveness to the needs of patients and society that supersedes self-interest; accountability to patients, society, and the profession; and a commitment to excellence and on-going professional development
- b. Demonstrate a commitment to ethical principles pertaining to provision or withholding of clinical care, confidentiality of patient information, informed consent, and business practices
- c. Demonstrate sensitivity and responsiveness to patients' culture, age, gender, and disabilities.

C.6 Systems-based Practice

Residents must demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value. Residents are expected to:

- a. Understand how their patient care and other professional practices affect other health care professionals, the health care organization and the larger society, and how these elements of the system affect their own practice;
- b. Know how types of medical practice and delivery systems differ from one another, including methods of controlling health care costs and allocating resources
- c. Practice cost-effective health care and resource allocation that do not compromise quality of care
- d. Advocate for high quality patient care and assist patients in dealing with system complexities
- e. Know how to partner with health care managers and health care providers to assess, coordinate, and improve health care and know how these activities can affect system performance.
- f. Professional attitudes and conduct require that trainees must also have developed a style of care which is:
 - i. Humane (reflecting compassion in providing bad news, if necessary; the management of the visually impaired; and recognition of the impact of visual impairment on the patient and society);
 - ii. Reflective (including recognition of the limits of his/her knowledge, skills and understanding);
 - iii. Ethical;
 - iv. Integrative (including involvement in an inter-disciplinary team for the eye care of children, the handicapped, the systemically ill, and the elderly); and
 - v. Scientific (including critical appraisal of the scientific literature, evidence-based practice and use of information technology and statistics).

C.7 Surgical skills

Residents are to demonstrate ability to perform surgeries expected of them at each level safely and where there are complications to manage these in a way that limits damage to ocular tissue and function. Residents are expected to

- a. Demonstrate complete control and mastery of the operating microscope and all procedure specific equipment

- b. Be familiar with the names of instruments and be confident with their use with no awkward movements during operations
- c. Demonstrate respect for tissue by consistently handling tissues appropriately with minimal damage,
- d. Show economy of movement with maximum efficiency by planning the course of the operation, anticipating potential problems and taking appropriate action

C.8 Population – based Care

The Resident must demonstrate the ability and commitment to address eye care needs in the population. Residents are expected to know how to

- a. Assess local eye care needs and resources
- b. Formulate and manage eye care programmes
- c. Mobilize the community and mobilise resources for implementation of the eye care programme
- d. Integrate eye care into health and health- related delivery services and the supporting health systems
- e. Collect data and apply health information as it relates to the population
- f. Design and implement a people-centred approach in eye health programmes

D. CANDIDATES’ SELECTION CRITERIA

A Medically qualified candidate who has

- 1. Fully registered in his/her country of practice
- 2. Completed at least two years Post qualification as a Medical Doctor at the time of entry.
- 3. Passed Primary examination within the last five years would have an advantage or latest within the first year of the programme.

Candidates who have not passed the primary within the first year of commencement would be required to withdraw from the programme.

- 4. The Candidate should register with the West African College of Surgeons on entry into the programme.
- 5. The Candidate should be a maximum of 40 years of age on entry.

E. PROGRAMME OBJECTIVES

The programme aims to train Specialists with

- 1. Intellectual knowledge
- 2. Community Orientation
- 3. Task Orientation
 - a. Clinical Skills
 - b. Surgical Skills
 - c. Optical Skills

- d. Quality Assurance
- e. Managerial skills
- f. Training skills
- g. Research skills

F. TRAINING PROGRAMME

The learning objectives for candidates in the Membership programme in Ophthalmology are designed to emphasize recall of information (bank of knowledge), understanding and application of basic sciences (e.g. anatomy, physiology, biochemistry, embryology, pharmacology) to the practice of Ophthalmology.

Candidates in the programme are expected to learn how to apply pathogenetic mechanisms to clinical problems, ordering and interpreting clinical, laboratory, and imaging information, development of a differential diagnosis, implementation of a reasonable and appropriate therapeutic medical and/or surgical plan, and anticipation, recognition, and treatment of complications.

Candidates completing the membership programme are expected to demonstrate a depth of knowledge and understanding expected of an independent Specialist not sub-specializing in the field of ophthalmology.

G. COURSE DURATION

Three years

H. COURSE TIMETABLE

H.1 Level 1

a. Basic Ophthalmology Course	-	-	-	-	-	2 months
b. Clinical Ophthalmology	-	-	-	-	-	9 months
c. 1 st year leave	-	-	-	-	-	1 month

H.2 Level 2

a. Other Specialty postings	-	-	-	-	-	2 months
b. 1 st Surgical posting at high volume surgical centre	-	-	-	-	-	3 months
c. Public health for eye care (PHEC/ CEH) course and research skills(5 weeks)	-	-	-	-	-	1.25mths
d. Rural posting, operational research and a Publishable Paper from the posting	-	-	-	-	-	3 months
e. Clinical Ophthalmology	-	-	-	-	-	2 months
f. 2 nd year annual leave	-	-	-	-	-	1 month

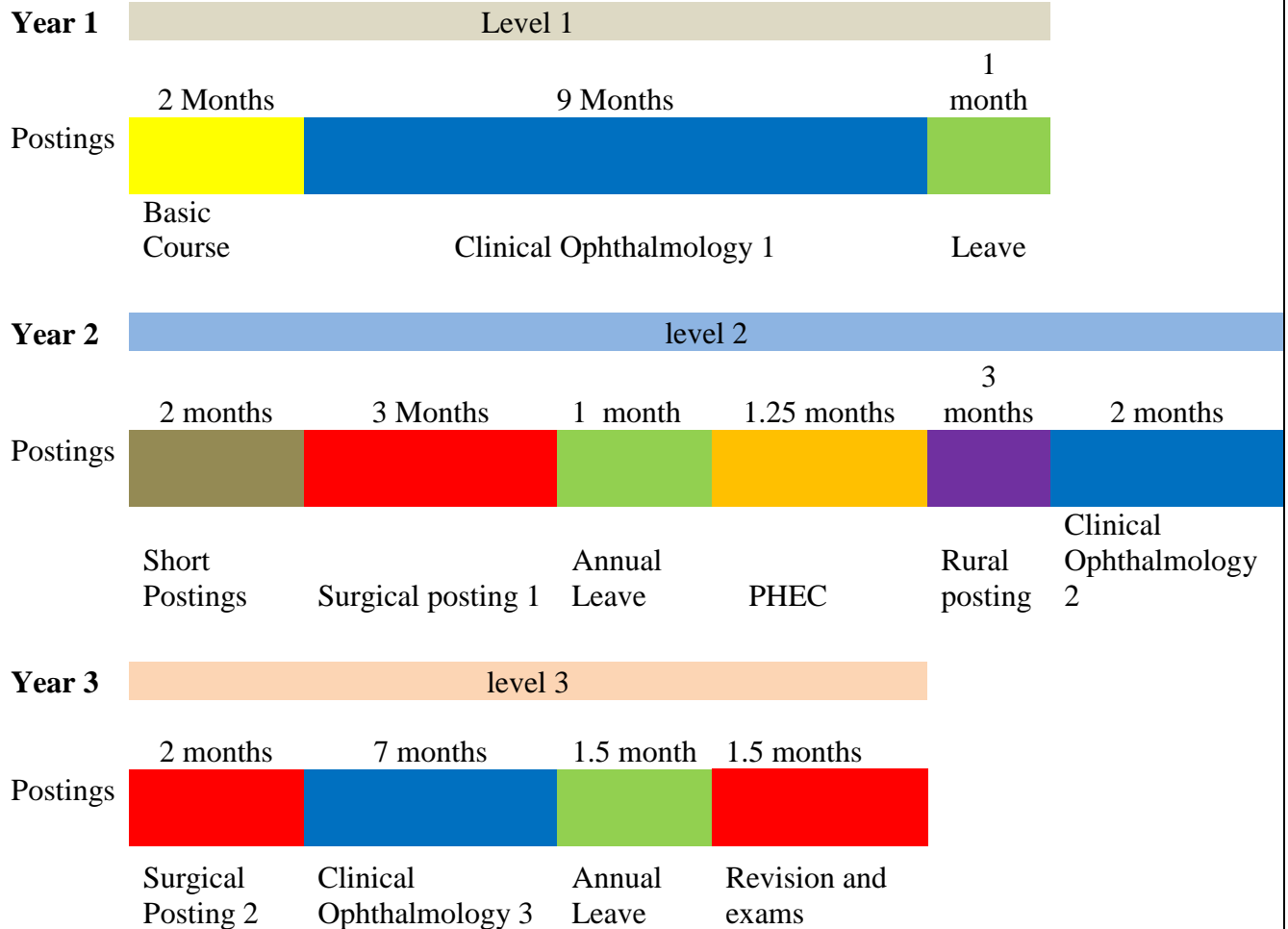
H.3 Level 3

a. 2 nd Posting to high volume surgical centre	-	-	-	-	-	2 months
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b. Clinical Ophthalmology	-	-	-	-	7 months
c. 2 nd year annual leave	-	-	-	-	1.5 months
d. Revision and exams – 4 weeks	-	-	-	-	1.5 months

PROPOSED STRUCTURE FOR MEMBERSHIP

Overview of Membership Training Programme



NB: The posting blocks drawn above are not to scale and are for illustration purposes only

The Membership levels approximate but are not exact to one academic year.

The candidates and training institutions need not follow the exact sequence of postings at each level, but all the postings must be completed in order to move to the next training level.

Basic Course at level 1 MUST be done within 6 months of commencing the training programme.

Leave periods (Vacation) can be taken at any time in the year convenient to institution and candidate

I. DETAILS OF TIMETABLE

I.1 LEVEL 1: Expected Outcomes

I.1. a. – BASIC OPHTHALMOLOGY COURSE (2 months):

At the end of this posting, the Resident should have adequate knowledge and skills in :

- i. Basic Science (Anatomy, Physiology, Biochemistry, Genetics, pharmacology & Pathology – as related to Ophthalmology)
- ii. General Clinical Ophthalmology
- iii. Basic Clinical examination skills
- iv. Basic Optics/Refraction - Principles and skills
- v. Basic Microsurgical Skills (Wet lab)

This 2-month posting should be done within the first Six months of entry.

I.1.b – CLINICAL OPHTHALMOLOGY 1 (9 months)

At the end of this posting, the Resident should have acquired basic knowledge of clinical ophthalmology, management of common eye disorders and proficiency in refraction skills.

This 9 month posting shall be at the base hospital. It shall include special attention to Optics/Refraction alongside with the medical/surgical Ophthalmology clinical exposure. This should include Lectures/ discussions etc in the training centre.

I.2 LEVEL 2

At the end of this level, the Resident should:

- i. Be proficient in refraction and performed as many cases as stipulated in the Logbook.
- ii. Be proficient in Surgery and performed as many cases as stipulated in the logbook.
- iii. Be proficient in diagnosing and managing common clinical disorders

I.2.a – OTHER SPECIALTY POSTINGS (2months)

These shall be in the following specialties

- i. Neurosurgery – 1 month
- ii. Neurology – 2 weeks
- iii. ENT - 2 weeks

The Residents are expected to appreciate the clinical presentation and management of cases in these specialties which have ophthalmic manifestations.

I.2.b - 1ST POSTING AT HIGH VOLUME SERVICE DELIVERY CENTRE (3months)

At the end of this posting, the Resident should understand high volume service delivery systems and be able to perform high quality Cataract Surgery with minimal supervision.

The training centre should ideally be able to provide high volume surgical services but if not available, the Resident should be posted to a high volume centre of which the Institution is part of the network.

I.2.c - PUBLIC HEALTH FOR EYE CARE (PHEC/ CEH) AND RESEARCH SKILLS COURSES – 5 weeks

At the end of this posting, the Resident should be equipped to apply the principles of community eye health management and control of eye diseases with public health dimension. He /she must have acquired teaching and research skills with emphasis on Public health research and translation into policy and practice.

These courses are to be carried out at designated centres in the sub region.

I.2.d. - RURAL POSTING – 3 months

The rural posting is supposed to be a way of rendering quality eye care service to the rural people while consolidating the core competencies and sub-competencies of the membership. During the posting, the resident will get a full understanding of health systems, assessment, integration and strengthening of eye health systems.

I.2.e. – CLINICAL OPHTHALMOLOGY POSTING 2 (2months)

At the end of this posting, the Resident should be able to have more advanced diagnostic skills and make more complex management decisions

This shall be done in base hospital

I.3 LEVEL 3

I.3.a - 2ND POSTING TO HIGH VOLUME SERVICE DELIVERY CENTRE – 2 months

At the end of this posting, the Resident should consolidate his skills in high volume service delivery systems and be able to perform high quality Cataract, Glaucoma and other ocular surgeries as listed in the logbook without supervision.

I.3.b Clinical Ophthalmology 3 (7 months)

At this stage the Resident should be able to work independently and assist in the training of Junior Residents, Medical students and general health workers.

J. Programme Delivery

J.1 . Models of Learning

- a. Organized courses
- b. Work-based experiential learning
- c. Local postgraduate meetings
- d. Independent self-directed learning
- e. Appropriate off-the-job education

These activities of Teaching, Training and Assessment would be achieved through a detailed programme as below:

a.Tutorials/seminars	-	-	-	-	-	-	-
Weekly							
b.Lectures(Daily during the Clinical Ophthalmology course, otherwise)	-	-	-	-	-	-	Monthly
c.Grand Round	-	-	-	-	-	-	Monthly
d.Journal club	-	-	-	-	-	-	Biweekly
e.Refraction clinics	-	-	-	-	-	-	2x/week
f.Case presentations	-	-	-	-	-	-	Weekly/ clinic
g.Clinical meetings/ Audits	-	-	-	-	-	-	Quarterly
h. Investigation days	-	-	-	-	-	-	Weekly
i.Hands-on surgical training (as evidenced by Surgical logbook),							
j. Hands-on clinical training,							
k.Wet-lab							
l. E-learning methods,							
m.Video-conferencing							
n.Groupwork							
o.OTHERS:							
a. At least half-day per resident per week for self study.							
b. Monthly assessment of logbooks							
c. Supervision of dissertation by trainers							
d. End of Posting/Rotation Assessments							
e. End of Level Examination(mock examination- Institution based)							
a.Essays/ SAQs							
b.Clinicals							
c.Orals							

Feedback

J.2. Appraisal of the Trainers and the training process

Internal quarterly appraisals of the training process using a structured appraisal format. This should be done by each training department at the base level and in each training facilities' network.

J.3. Feedback During the training programme

Regular and timely feedback on performance is essential for successful work-based experiential learning.

Specific details of who should give feedback and the timing in relation to training placements will be the responsibility of the Residency Training Co-ordinators and HODs.

Feedback should include the following important elements:

- a. An initial appraisal meeting shortly after the start of a training placement to establish learning goals
- b. An interim appraisal meeting to discuss progress against the learning goals
- c. An appraisal meeting towards the end of the training placement to agree which learning goals have been achieved.
- d. Structured written feedback from clinical supervisors to the Residency Training Co-ordinator.
- e. Appropriately structured written feedback from other departmental staff (multi-source feedback) at whatever posting the Resident is undergoing. This should include members of the eye care team, medical staff in relevant directorates e.g. radiology, pathology, anaesthesia and managerial staff.
- f. Feedback from patients and carers obtained from patient surveys etc.
- g. Feedback from College examinations, if a trainee has been unsuccessful.
- h. Feedback from the Resident on his/her training process.

The results of such feedback will form part of the Residents' portfolio.

J.4. Supervision of the trainee throughout the training programme

The overall supervision of the Resident lies with the Residency Training Co-ordinator.

Trainees will work to a level of clinical supervision commensurate with their clinical experience and level of competence. This will be the responsibility of the relevant clinical supervisor.

Centres are encouraged to allocate personal tutors to each Resident in addition to the Clinical supervisor and Residency training co-ordinator.

J.5. Governance

This curriculum is a document of the WACS, one of the providers as identified in the above definition of governance. It is hoped that the WACS will, in its relationship with government, professional and regulatory bodies, positively influence the decision- making processes as regards the membership programme and cadre. Specific to the membership programme, the major stakeholders are the training centers who employ the residents, WACS and the training facilities to which they are posted. It is imperative therefore that there is joint vision between the WACS and the employment cum training facilities. Examples of this are; the WACS will be required to inform the training centers to offer employment to residents who have fulfilled the selection criteria, to release residents and support training activities outside their institutions. The administration at the benefitting primary health facilities will fund activities in their facilities. The design of the programme has addressed public accountability through its feedback processes, quality through its training methodology, and supervisory mechanisms, hopefully equity through selection, increased production and government policy on deployment. Exposure to participation and voice of the health services at different levels is captured in the postings to these levels as well as by the feedback mechanism. Competency in governance will be included in the module on public health. Accountability, and quality of trainers is addressed through the trainers appraisal system by self, peers and residents. The accountability to donors and aid effectiveness by donors will need to be addressed through a structured project management process.

Sustainability will be ensured by the WACS through its existing mechanisms for all training programmes. However indicators for and collection, analysis and utilisation of data on the management and effectiveness of resources will be required as part of a comprehensive monitoring and evaluation process of the membership programme. This will require having in place an adequate HRH information system (HRIS), HRH research and the requisite capacity building. Fortunately in the West African sub region, a suite of four, free, open source software – iHRIS (Annex z) can be accessed and implemented with support from the West African Health Organisation (WAHO) and the Capacity Plus project.⁴

K. Proposed assessment methods

- a. Competence in patient management and health promotion and disease prevention (**Assessment method: Case based Discussion (CbD)**).
- b. Resident clinical skills (**Assessment method: Clinical Rating Scale (CRS) and Objectively Structured Clinical Examination (OSCE)**)
- c. Procedural skills (**Assessment method: Direct Observation of Procedural Skills (DOPS)**)
- d. Most of the “Attitudes, Ethics & Responsibilities” and Communication skills (**Assessment method: Multiple Source Feedback (MSF)** where appropriate persons are approached to give feedback on the resident’s performance.
- e. Technical skills (**Assessment method: Objectively Structured Assessment of Technical Skills (OSATS)**)
- f. Log Books (**Assessment method for surgeries, examination procedures, refraction, technical procedures**) will be kept by each resident and regularly assessed by trainers
- g. An exit exam at the end of level 3.
- h. Inter-level assessments to evaluate the Resident’s progress and counsel accordingly
- i. Adequate preparation of Residents for the exit exam which would include revision process and mock exams in the preceding 6weeks to the exams.

L. The Exit Exams

L.1 Eligibility

- a. Passed Primaries
 - b. At least three years of training with complete portfolio by the time of the exam.
 - c. Evidence of attendance of an Update Course
-

L.2 Examination Process

- a. Theory Paper (Paper I – MCQ, Paper II – Optics and Refraction, Paper III – Medical and Surgical Ophthalmology with Community Ophthalmology)
- b. Clinical Examination – Short Cases (OSCE), Long Cases, Refraction
- c. Orals - Cases seen, scenarios, questions on portfolio
(Candidates are to come to the examination with their Portfolios)

Detailed Curriculum

1.BASIC SCIENCE CURRICULUM for the primary examination

Anatomy

All trainees must understand and apply knowledge of the anatomy of the eye, adnexae, visual pathways and associated aspects of head, neck and neuro anatomy. It extends to applied anatomy relevant to clinical methods of assessment and investigation relevant to ophthalmic practice. They must be able to use this knowledge when interpreting clinical investigations and in the practice of ophthalmic surgery.

The Orbit and adnexae: Osteology, orbital foramina, eyelids, conjunctiva, lacrimal system, extraocular muscles, intraorbital nerves, vessels, orbital fascia

Ocular anatomy: Conjunctiva, cornea, sclera, limbus and anterior chamber angle, iris and pupil, lens and zonule, ciliary body, choroid, retina, vitreous, optic nerve

The Cranial Cavity: Osteology of the skull, meninges, vascular supply, foramina, cranial fossae, pituitary gland and its relations

Central Nervous System: Cerebral hemispheres and cerebellum including microscopic anatomy of visual cortex, cranial nerves, spinal cord, vascular supply, visual pathways, control of eye movement, autonomic regulation of eye.

Head and neck: Nose, mouth, paranasal sinuses, face and scalp, pharynx, soft palate, larynx, trachea, major arteries and veins, lymphatic drainage of the head and neck

Cardiovascular system: Gross anatomy of the heart, and major blood vessels. Microscopic anatomy of arteries, veins and capillaries

Physiology

All trainees must understand and apply knowledge of the physiology of the eye, adnexae and nervous system, including related general physiology. This includes the applied physiology relevant to clinical methods of assessment in ophthalmic practice. They must be able to use this knowledge when interpreting clinical symptoms, signs and investigations and in the practice of ophthalmic medicine and surgery.

General principles including:

Maintenance of homeostasis: Characteristics of control systems - nervous and hormonal
Body fluids - volume, osmolarity, osmotic and oncotic pressure, and electrolyte (including H⁺) concentrations

Excitable tissues – nerve and muscle: Structure and function of nerve cell, membrane potential, action potential, nerve conduction, synapse, the motor unit, muscle

Blood: Plasma composition and functions, cell types, immune mechanisms, blood groups, haemoglobin and red and white cell formation and destruction, anaemias, clotting and fibrinolysis

Cardiovascular system: Pressure resistance and flow in blood vessels, blood pressure And blood flow, the activity of the heart and its control, cardiac output, control Mechanisms within the CVS, transcapillary exchange, tissue fluid formation

Respiratory system: Structure, lung volumes, composition of respiratory gases, lung mechanics, gas exchange in the lung, carriage of O₂ and CO₂ in blood, ventilation perfusion relationships, chemical and neural control of ventilation

Nervous system and special senses: Receptors, synapses, afferent pathways, efferent pathways, cerebral cortex, control of movement, hearing, pain and its control, autonomic nervous system, cholinergic transmission, adrenergic transmission

Endocrinology: Hormonal control, hypothalamus, pituitary, thyroid / parathyroid, adrenals, pancreas

Nutrition: Dietary requirements, absorption, vitamins

Kidney and adrenal cortex: Glomerular and tubular function, osmolality and pH of body Fluids

Ocular physiology including:

Physiology of tear production and control and the lacrimal drainage system

Physiology of aqueous production and drainage including principles of intraocular pressure measurement

Physiology and biochemistry of the cornea

Lens metabolism

Physiology of the vitreous

Retinal physiology including phototransduction

Retinal pigment epithelium

Choroid

Blood ocular barrier

Physiology of vision including:

Visual acuity

Accommodation

Pupillary reflexes

Light detection

Dark adaptation

Colour vision

Electrophysiology of the visual system

Visual fields

Contrast sensitivity

Eye movements
Stereopsis
Motion detection
Visual perception
Magnocellular and parvocellular pathways

Biochemistry and cell biology

All trainees must understand and apply knowledge of the basic biochemistry and cell biology. This includes in particular those aspects relevant to common eye diseases. They must be able to use this knowledge when interpreting clinical symptoms, signs and laboratory investigations and in the practice of ophthalmic medicine and surgery.

Biochemistry of the cell: Organelles, plasma membranes, cytoskeleton, nucleus (DNA, RNA), transport mechanisms, cell-cell communications, cell-matrix interactions

Signalling: Growth factors, cytokines, hormones, eicosanoids, receptors, signal transduction, intracellular signalling pathways (e.g. second messengers)

Cellular processes: Cell cycle, protein synthesis (transcription, translation, post-translational modification), nucleic acid synthesis, proliferation, migration, apoptosis, metabolic processes
Connective tissue and extracellular matrix: Extracellular matrix molecules, composition of ocular extracellular matrices, synthesis/degradation, cell-matrix interactions

Biochemical and molecular biological techniques: Examples include: gene cloning, polymerase chain reaction, in-situ hybridisation, immuno-localisation, ELISA assays, Western, Northern and Southern blotting.

Biochemistry and cell biology of ocular tissues: Cornea, sclera, ciliary body, lens, vitreous, retina, choroid.

Active oxygen species: Free radicals and H₂O, scavengers, lipid peroxidation, phospholipase A

Pathology

All trainees must understand and apply knowledge of pathology, especially the specialist pathology of the eye, adnexae and visual system. This includes histopathology, microbiology and immunology and other branches of pathology. They must be able to use this knowledge when interpreting clinical symptoms, signs and investigations and in the practice of ophthalmic medicine and surgery.

Acute inflammation: Chemical mediators, cellular mechanisms
Wound healing

Chronic inflammation: Types, granulomata, immune mechanisms, ulceration, specific examples

Immunological mechanisms: Types of hypersensitivity reaction
Graft rejection

Degenerations: Examples: amyloidosis, calcification
Ageing and atrophy
Hypertrophy, hyperplasia and metaplasia

Vascular disorders: Atheroma, thrombosis (and homeostatic clotting mechanisms
embolism (including pulmonary embolism), ischaemia and infarction, congestion and
oedema, angiogenesis, hypertension, aneurysms, diabetic microangiopathy
Shock

Neoplasia: Definition, terminology, concepts; benign and malignant tumours;
carcinogenesis; gene control – including regulation of apoptosis; oncogenes; geographical
and environmental factors; pre-neoplastic conditions; effects of irradiation and cytotoxic
drugs

BASIC OCULAR PATHOLOGY

With an emphasis on:

Cornea endothelial dysfunction and corneal dystrophies

Glaucoma

Cataract

Diabetes

Age Related Macular Degeneration

Retinal vascular occlusion

Ocular neoplasia

Retinal detachment and Proliferative Vitreo-retinopathy

MICROBIOLOGY:

The biological and clinical behaviour of the micro-organisms responsible for infections

Elementary principles of microbial pathogenesis: Concepts of colonisation, invasion, endotoxins,
exotoxins, virulence and pathogenicity etc.

Gram staining and classification

Commensal eye flora

Viruses: Classification, structure and replication, antiviral agents, laboratory methods of viral
detection; viral infections of the eye.

Prions

HIV and AIDS

Fungi: Classification, factors which predispose to fungal infection, antifungal agents.

Toxoplasmosis, Chlamydia, Acanthamoeba, helminthic infections

Principles of sterilization: Disinfection and asepsis and the application of these to current practice and practical procedures

Antimicrobials: Spectrum of activity, mode of action, pharmacokinetics and resistance

IMMUNOLOGY

Principles of immunology e.g. non-specific resistance, genetic basis of immunity, cellular and humoral mechanisms

Host defence mechanisms with particular reference to the eye

Mechanisms of immunologically-induced tissue damage with special reference to the eye

Role of soluble mediators (cytokines and chemokines) in regulation of inflammatory responses

MHC antigens, antigen presenting cells and antigen processing

Transplantation immunology (with particular reference to the cornea)

Immunodeficiency and immunosuppression

Tissue regulation (with particular reference to the eye) of inflammatory responses)

Growth and senescence

All trainees must understand and apply knowledge of growth, development and senescence, and the anatomical, physiological and developmental changes which occur during embryogenesis, childhood and ageing relevant to ophthalmic practice. They must be able to use this knowledge when interpreting clinical symptoms, signs and investigations and in the practice of ophthalmic medicine and surgery.

Embryology: General embryology especially at early stages; embryology of the eye, orbit, adnexae and visual pathways; the embryological origins of congenital malformations of the eye.

Child development: key milestones in childhood development especially regarding the visual and central nervous systems.

Senescence: the process of ageing and degeneration.

Therapeutics

All trainees must understand and apply knowledge of clinical therapeutics relevant to ophthalmic practice. They must be able to use this knowledge when prescribing for a patient. They must understand the therapeutics used in general medicine and surgery to a basic standard. They must be aware of the possible ocular effects of systemic medications and systemic effects of ocular medications.

PHARMACOLOGY

Pharmacokinetics and pharmacodynamics: General and specific to ocular tissues Drug-receptor interactions

Mechanisms of drug actions (including receptor pharmacology and biochemical pharmacology)

Mechanisms of drug toxicity

Specific classes of pharmacological agents: Examples include catechol aminergics, cholinergics, serotonergics and histaminergics, eicosanoids

Pharmacology of drugs used in inflammation and immunosuppression

Pharmacology of drugs used in glaucoma

Local anaesthetics

Analgesics

Clinical Genetics

All trainees must understand and apply knowledge of clinical genetics relevant to ophthalmic practice. They must be able to use this knowledge when advising patients about patterns of inheritance. They must recognise when it is appropriate to refer a patient for genetic counseling. They must recognise when it is important to offer a consultation with family members.

Organisation of the genome: Genes, chromosomes, regulation of transcription

Mendelian genetics: General principles

Population genetics: General principles

Cytogenetics: Aneuploidy, deletions, translocations, mosaicism, chimerism

Genetic basis of eye conditions: Genes involved in ocular disorders or systemic disorders with an ocular phenotype

Investigative and research techniques: Linkage analysis, candidate genes, twin studies, association studies

Gene therapy: General principles

Suggested reading list for Primary Examination

This list is not designed to be exhaustive. Similarly, only some sections in these books are directly relevant to the examination.

1. The Eye: Basic Sciences and Practice. Forrester JV, Dick AD, McMenemy P, Lee WR. WB Saunders 2003. ISBN: 0-7020-2541-0
2. MCQ companion to the Eye. Basic Sciences in Practice. Galloway PH, Forrester JV, Dick AD, Lee WR. WB Saunders 2001. ISBN: 0702025666
3. American Academy of Ophthalmologists. Basic and Clinical Science Course. ISBN: 1-56055-570-X
4. Volume 1. Update on general medicine.
5. Volume 2. Fundamentals and principles of ophthalmology
6. Volume 4. Ophthalmic pathology and intraocular tumours.
7. Adler's Physiology of the Eye. Ed. Hart WM. Mosby 2003. ISBN: 0-323-01136-5
8. Clinical Anatomy of the Eye. Snell RS, Lemp MA. Blackwell Scientific Publications 1998. ISBN: 063204344X
9. Clinically orientated anatomy. Moore KL, Dalley AF. Lippincott Williams and Wilkins 2005. ISBN: 0781736390.
10. Pathology for Surgeons in Training: An A-Z revision text. Gardner DL and Tweedle DEF. Arnold 2002. ISBN: 0340759046
11. Ocular Pathology, 5th ed. Yanoff M and Fine BS. Mosby 2002. ISBN: 0323014038
12. Medical Microbiology. Greenwood D, Slack R, Peutherer J. Churchill Livingstone 2002. ISBN 0443070776
13. Medical pharmacology at a glance. Neal MJ. Blackwell Publishing 2002. ISBN: 0632052449
14. Clinical Ocular Pharmacology. Jaanus SD, Barlett JD. Butterworth-Heinemann 2001. ISBN: 0750670398

15. Genetics for Ophthalmologists: The molecular genetic basis of ophthalmic disorders. Black GCM. Remedica Publishing 2002. ISBN: 190134620X
 16. Biochemistry of the eye. Whikehart R. Butterworth-Heinemann 2003. ISBN: 0750671521

2.CURRICULUM FOR BASIC OPHTHALMOLOGY COURSE

Course Timetable

Since the basic medical training in ophthalmology is minimal and in recognition of the objectives set, the length of the course will be two months with an examination at the end.

SUMMARY TABLE

Module I:	Basic sciences and clinical Foundations of ophthalmology
Module II:	Basic Refraction/Optics+practicals
Module III:	Clinical Foundations of Ophthalmology+clinical posting
Module IV:	Basic microsurgical skills including wet/dry lab
Revision and examinations	
TOTAL	- 2 months

Objectives of the Course

At the end of the course new residents should be able to do the following:

Educational

1. Understand the pathogenesis of ocular conditions
2. Understand the clinical features of common ocular conditions
3. Diagnose the common eye conditions
4. Understand the basic optics of ophthalmic instruments

Task Oriented

Clinical Skills

Medical:

- Diagnose and manage common ocular disorders
 - **Have Basic skills in:**
- **Basic eye examination**
- Assessment of visual acuity, distance and near

- Direct ophthalmoscopy
- Slit lamp examination
- Tonometry
- Retinoscopy
- Perimetry and assessment of ocular motility
- Swab- taking and gram staining
- Indirect ophthalmoscopy
- Gonioscopy
- Exophthalmometry
- Skin snipping and examination for microfilaria in endemic areas

Surgical Skills

Know and be able to perform the

- Types of conjunctival flaps
- Types of sutures and indications for their use
- The various suturing techniques
- The various types of anterior capsulotomy
- The various types of graft
- Administering sub conjunctival injections
- Retrobulbar injection
- Facial nerve/and lid block

2. Course Content

A: BASIC SCIENCES

Basic clinical medicine requires a clear understanding of the basic sciences which should be taught with a clinically oriented and whenever possible an integrated approach.

The applied basic sciences relevant to the membership/Fellowship course are:

1. Anatomy including Embryology
2. Physiology and Biochemistry
3. Pathology including immunology and patterns of disease
4. Genetics
5. Pharmacology

THE BONY ORBIT AND PARANASAL SINUSES

ANATOMY

The Bony Orbit

- The roof of the Orbit, structure, relations
- The medial wall, structure, relations
- The floor, structure, relation
- The lateral wall, structure, relations
- **Fissures and Canals**
- Superior orbital fissure
- Inferior orbital fissure

- Anterior and posterior ethmoidal fissure
- Optic foramina

Surface Anatomy – The orbital margin

The Paranasal Sinuses

- Maxillary sinus
- Frontal sinuses
- Ethmoidal sinuses
- Sphenoidal Air sinuses

Nerve supply

Lymphatic Drainage.

PATHOLOGY OF THE ORBIT

Orbital Inflammation

- Orbital Cellulitis
- Orbit Pseudotumours
- Dysthroid Eye Disease

Burkitts Lymphoma and other tumours of the orbit.

Paranasal inflammations and tumours.

THE OCULAR APPENDAGES

ANATOMY

Eyelids

- Structure, glands, etc
- Palpebral ligaments (Medial and Lateral)
- Orbital Septum/ Relations
- Blood Vessels of the Lids
- Orbicularis Oculi/ Relations
- Actions of muscles
- Nerve Supply

The Eyebrows

Conjunctiva

- Palpebral
- Fornices
- Bulbar
- Structure of the conjunctiva
- Arteries, Veins, Lymphatic drainage and nerve supply of the conjunctiva

The caruncle and plica semilunaris

The Lacrimal Apparatus

- The Lacrimal Gland
 - Structure
 - Vessels, Lymphatics and Nerves
- The Puncta, Lacrimal canaliculi
- The Lacrimal Sac
 - Relations
- The Nasolacrimal Duct
- Structure and relations

PHYSIOLOGY OF THE EYELIDS

Secretions of the Eyelids

Normal Movements of the Eyelids

- Opening
- Closure
- Blinking

PHYSIOLOGY: THE LACRIMAL APPARATUS

The Tear Film and its functions

Composition of Tear

Secretion of Tears – (Basic and Reflex Secretion)

Drainage of Tears

PATHOLOGY OF THE EYELIDS AND CONJUNCTIVA

The Eyelids

Inflammations - Acute
- Chronic

Including stye, chalazion, trachoma, leprosy

Tumours - Benign
- Malignant

The Conjunctiva

Conjunctivitis - Infective :

- Bacteria
- Viral
- Chlamydial
- Parasitic (Loaloa)
- Allergic, vernal

Degenerations

- Pterygium
- Pinguecula

Tumours - Benign

-Malignant

ANATOMY OF THE CORNEA AND SCLERA

Structure, Vessels and Nerves of the Cornea and Sclera.

PHYSIOLOGY AND BIOCHEMISTRY OF THE CORNEA

Corneal Metabolism

Permeability and transport of Drugs

Factors affecting drug penetration

- Drug Solution
- Chemical structure of the solute and solvent
- Molecular weight and concentration of transported molecules
- pH and osmolarity of Solutions
- Surface tension reducing agents
- Layers of the corner

Corneal Transparency

- Physical Factors
- Mechanisms that preserve corneal dehydration:
 - Anatomic integrity of endothelium and epithelium
 - Electrolyte and osmotic balances
 - Evaporation of water through the anterior surface
 - Intraocular pressure
- Effects of swelling on corneal transparency

Healing of corneal wounds

PATHOLOGY OF THE CORNEA

Corneal Ulcers/Keratitis

Bacterial

Viral

Fungal

Parasitic (e.g. Microfilaria in Onchocerciasis)

Mooren's Ulcer

Nutritional

Corneal Opacification

Degeneration of the Cornea

Keratoconus, corneal dystrophies and corneal endothelial decompensation

THE LENS

ANATOMY

- Structure of the lens
- The Ciliary zonule

PHYSIOLOGY AND BIOCHEMISTRY

Biochemistry of the lens

Clinical modification of lens proteins in Ageing and Cataract

Accommodation

- Mechanism of Accommodation and Refraction
- Depth of Field and Depth of focus
- Relationship between Accommodation and Convergence

PATHOLOGY

Age-related cataract

Pseudo-exfoliation

Congenital Cataract

Lens-induced reactions

Complications of Couching

THE UVEAL TISSUE

ANATOMY

Structure, Vessels, and Nerves of the Iris, Ciliary Body and the Choroid.

PATHOLOGY

Inflammations of the choroid

Uveal Naevi and Malignant Melanoma

Tumours metastatic to the eye e.g. from breast and lung

PHYSIOLOGY OF THE PUPIL

Review Pharmacology of the pupil

- Cholinergic/anticholinergic drug
- Sympathomimetic and sympatholytic drugs
- Pupillary reaction to light, accommodation, convergence
- Pupillary Defects: Afferent and Efferent

THE AQUEOUS HUMOUR CHAMBERS

ANATOMY

Anterior and Posterior Chambers and Anatomy of the angle and the trabecular meshwork.

PHYSIOLOGY OF AQUEOUS HUMOUR

The Ciliary Epithelia

Blood aqueous Barrier

Aqueous Humour Formative Mechanism:

- Active Secretion
- Ultra Filtration
- Carbonic anhydrase inhibition
- Control of Aqueous Formation

Aqueous Humour Composition

- Exchange of substance between aqueous and surrounding tissues
- Osmolarity
- Electrolytes

THE INTRAOCULAR PRESSURE

Factors affecting the Intraocular Pressure (IOP):

- Resistance to flow and facility of flow
- Osmotic Pressure
- Drainage of aqueous (Trabecular/Uveoscleral out-flow)
- Episcleral venous pressure
- Ocular rigidity

Measurement of intraocular pressure (IOP).

PATHOLOGY: GLAUCOMA

- Primary Open Angle Glaucoma (POAG)
- Primary Angle Closure Glaucoma (PACG)
- Secondary Angle Closure Glaucoma (SOAG)
- Congenital Glaucoma
- Tissue changes caused by Glaucoma – Optic Nerve
- Apoptosis

ANATOMY AND PHYSIOLOGY OF THE VITREOUS

Embryology and Anatomy

Physical Properties of the vitreous

Molecular structure of the Vitreous

Changes in Vitreous Volume

Chemical composition of the Vitreous and exchange of substances

Vitreous substitution

THE RETINA

ANATOMY

- Structure

- Blood Supply

PHYSIOLOGY AND BIOCHEMISTRY

Blood-retinal Barrier

Visual Pigments

Bleaching of Visual Pigments; Visual Cycle, Photoreceptor renewal

Carbohydrate Metabolism

Neurotransmitters in the Retina

Nutrition and the Retina

The Electrical Phenomena in the Retina

- Electroretinogram (ERG) Pattern

- Electro-oculogram (EOG)

- Physiologic basis

Visual Adaptation

- Dark adaptation and Regeneration of Rhodopsin
- Light adaptation

Colour vision

- Wavelength discrimination
- Trichromacy of colour vision

PATHOLOGY OF THE RETINA

Retinal Inflammatory Disease

- Onchocerciasis
- Toxoplasmosis
- Toxocariasis

and other Chorioretinal inflammations.

Retinal Vascular Disorders

- Diabetic retinopathy
- Sickle cell disease
- Hypertension (+Toxaemia of pregnancy)
- Retinal artery and vein occlusion

Retinal Detachment

Other retinal disorders

Diseases of the Retinal periphery

Diseases of the macula including age related macular degeneration

Chorioretinal Degenerations

Retinoblastoma

VISUAL ACUITY

The form sense – discrimination between stimuli of varying intensity and position

Definition of Visual Acuity

Measurement (Distance and Near)

Factors influencing Visual Acuity

- Refractive Error
- Luminance
- Contrast
- Pupil Size
- Exposure duration
- Perception
- Target and eye movement
- Ageing

Methods of assessment eg Snellen's, log mar

ANATOMY OF THE EXTRAOCULAR MUSCLES

The Extrinsic Muscles

- Structure

The Extraocular Muscles

- 4 Recti
- 2 Obliques
- 1 Levator Palpebrae superioris
- Relations, Nerves, Blood Supply, Actions

The Tenon's Capsule (or Fascia Bulb)

The Orbitat fat:

- Apertures at the base of Orbit through which Orbital fat may herniate.

PHYSIOLOGY OF THE EXTRAOCULAR MUSCLES

Anatomic Relations, Extraocular muscles and Orbit

The Conjugate eye movements

The non-conjugate eye movements

Binocular Vision

Binocular single vision and stereopsis

Monocular cues

Clinical Assessment of Binocular movements

ANATOMY - CRANIAL NERVES

Origin, Course and Relations

Nucleus and connections of

the Oculomotor Nerve (III)

the Trochlear (IV)

the Abducens (VI)

the Trigeminal (V)

the Gasserian Ganglion

the Facial Nerve (VII)

Sympathetic and Parasympathetic Nerves

ANATOMY - THE ORBITAL VESSELS

The Ophthalmic Artery:

- Course, relations, branches

The veins that drains the Face and the Orbit:

- Superior Ophthalmic veins: Tributaries
- Angular Vein: Tributaries
- Cavernous sinus: Tributaries

Lymphatics of the Orbit

ANATOMY AND PHYSIOLOGY - THE VISUAL PATHWAYS

The Optic Nerve (II)

- Course and Relations
- Structure of the Optic Nerve

The Optic Chiasma

- Relations

The Optic Tracts

- Course and relations

The Lateral Geniculate Bodies

Blood supply of the Visual Pathway

PATHOLOGY - THE OPTIC NERVE

- Inflammation
- Optic Atrophy
- Papilloedema
- Neoplasia

EMBRYOLOGY

Development of the eye and adnexae

Congenital abnormalities

GENERAL PATHOLOGY

Pathogenesis of Disease

Multifactorial Causation

Inflammatory Reaction

- Elements of the Inflammatory Reaction
- Infections and non-infectious agents of Inflammation
Granulomatous and Non-granulomatous
- Cellular sequelae of inflammation (Healing and Repair)

Trauma: Ophthalmic wound healing

- Cellular components
- Healing in specific tissues
- Surgical Trauma
- Non-surgical Trauma

Principles of Immunology

Mechanisms of Immune Reactivity (Types 1 to V reactions)

Basic Genetics

- Pattern of Disease inheritance

Multisystem Disease

Ageing, Atrophy and Degeneration

Hypertrophy, hyperplasia and metaplasia

Neoplasia - Benign

Malignant

MICROBIOLOGY

Infective organisms of the eye

Conjunctival Swab/Corneal Scraping for Gram Staining and Culture

Principles of Sterilisation

PHARMACOLOGY

Review of Principles of Pharmacology

- Pharmacokinetics
- Eye Drops
- Ointments
- Periocular injections
- Systemic Therapy

- Pharmacodynamics

Cellular Pharmacotherapeutics

- Cholinergic Agents
- Muscarinic drugs
- Nicotinic drugs
- Adrenergic Agents
- Alpha adrenergic agents
- Beta adrenergic agents
- Beta adrenergic antagonists
- Carbonic anhydrase inhibitors
- Osmotic agents
- Actions and uses
- Agents
- Intravenous and oral

Anti-inflammatory agents

- Glucocorticoids
- Non-steroidal anti-inflammatory agents
- Antihistamines and sodium chromoglycate
- Antimetabolites
- Antibiotics
- Antibacterial agents
- Antifungal agents
- Antiviral agents
- Local Anaesthetics

Ocular Toxicology (To be treated with various drugs)

B: OPTICS AND REFRACTION

I PHYSICAL AND GEOMETRIC OPTICS

1. *Properties of light*
 - (a) Electromagnetic Spectrum
 - (b) Wave theory
 - (c) Particle theory
2. *Refraction*
 - (a) Laws of refraction (Snell's Law)
 - (b) Refraction at a plane surface
 - (c) Refraction at curved surface
 - (d) Critical angle and total internal reflection
3. *Prisms*
 - Definition
 - Notation of prisms
 - Uses in Ophthalmology (diagnostic and therapeutic)
 - Types of prisms

4. *Spherical Lenses*
 - Cardinal points
 - Formation of the image
 - Vergence power (dioptric power)
 - Magnification
 - Spherical decentration and prism power
5. *Astigmatic Lenses*
 - Cylindrical lenses
 - Maddox rod
 - Toric lenses
 - Conoid of Sturm
 - Jackson' Cross cylinder
6. *Notation of Lenses*
 - Spectacle prescribing
 - Simple transposition
 - Transposition of Lens Prescription
7. Identification of Unknown Lenses
 - Neutralisation
 - Focimetry
8. Aberration of Lenses
 - Spherical aberration
 - Chromatic aberration
 - Correction of aberration relevant to the eye
 - Duochrome test

II. CLINICAL OPTICS

1. Optics of the eye
2. Pupillary response and its effect on the resolution of the optical system (Stiles-Crawford Effect)
3. Visual acuity
4. Emmetropia
5. Ametropia
 - Myopia
 - Hypermetropia
 - Astigmatism
 - Prevalence
 - Inheritance
 - Changes with age
 - Surgically induced
 - Correction of ametropia
 - Spectacle lenses

- Contact lenses
- Anisometropia
- Aniseikonia
- 6. Aphakia (including problem of spectacle correction)
- 7. Presbyopia
- 8. Spectacle magnification
- 9. Effective power of lenses
- 10. Intra-ocular lenses; types
- 11. Keratometry and assessment of IOL requirements
- 12. Low vision devices
 - High reading addition
 - Magnifying lenses

III. CLINICAL REFRACTION

1. Theory of refraction
2. Retinoscopy
3. Measurement of IPD (Near & Far), BVD, Segment height
4. Measurement of refraction
5. Decentration of lenses and prismatic effect
6. Best form lens
7. Prescribing multifocal lenses
8. Prescribing for children
9. Cycloplegic refraction

IV. THEORY OF INSTRUMENTS

1. Direct Ophthalmoscope
2. Indirect Ophthalmoscope
3. Retinoscope
4. Focimeter
5. Simple magnifying glass (Loupe)
6. Slit-Lamp Microscope-including methods of examination
7. Stereo-tests
8. Applanation tonometry
9. Lenses used for fundus examination
 - Biomicroscopy (+ 78,+90D lens, Hruby lens, etc)
10. Keratometer
11. Gonioscope and 3 mirror lens

C: CLINICAL OPHTHALMOLOGY

Clinical ophthalmology consists of two sections:

- i. Foundations of Clinical Ophthalmology
- ii. Hospital- Based Practice

I Foundations of Clinical Ophthalmology –

Lectures
Clinical Demonstration
Teaching Ward Rounds
Tutorials
Assessment

1. *History- Taking and Examination of the Eye*

A. History

Chief Complaint
Course of Chief Complaint
Associated Complaints
Other Medical Illness
Family History

B. Examination of the Eye

- (i) Diffuse Light
 - Facial Examination
 - Orbital examination
 - Lid Examination
 - Movement
 - Lid margin
 - External Eye Examination
 - Pupil
 - Lens
- (ii) Ophthalmoscopy
- (iii) Slit Lamp Examination
- (iv) Tonometry
 - Schiotz
 - Applanation
- (v) Gonioscopy (optional)

C. Visual Function Tests

Visual Acuity - Distance

- Pinhole examination

Near Vision
Colour Vision Tests – Ishihara
Visual Field Tests

- Confrontation
- Perimetry
- Scotometry

2. *Diseases of the Eyelids*

Congenital Ptosis
Infections

- Styes
- Blepharitis

Injuries

Lid Closure Defects

- Entropion
- Ectropion
- Lagophthalmos
- Chalazia and other lid swellings

3. *Disease of the Conjunctiva*

Infections

- Ophthalmia Neonatorum
- Bacterial
- Viral; herpetic and measles,,
- Chlamydial; trachoma
- Parasitic

Vernal Conjunctivitis and other allergy

Pterygium

Injuries

- Laceration
- Chemical Burns

Tumours

4. *Diseases of the Cornea and Sclera*

Corneal Ulcers/Keratitis

- Bacterial, Viral, Fungal, Parasitic, Nutritional,
Traditional Eye Medications

Trauma

- Foreign Bodies, abrasions
- Laceration

Mooren's Ulcer

5. *Glaucoma*

Diagnostic Methods

- Tonometry
- Disc Assessment
- Perimetry
- Gonioscopy (optional)

Congenital Glaucoma

Primary Open Angle Glaucoma

Primary Closed Angle Glaucoma

Secondary Glaucomas

Management of Glaucomas

- Chemotherapy
- Surgical
- Others

5. *Ocular Injuries*

Contusion
Penetrating
Intraocular Foreign Body
Burns
- Thermal
- Chemical
Orbital Fractures

7. *Uveal Diseases*

Uveitis
Tumours

8. *Retinal Diseases*

Vascular
- Hypertensive Retinopathy
- Diabetic Retinopathy
- Sickle Cell Retinopathy
- Retinal Artery Occlusions
- Retinal Vein Occlusions
Retinal Degenerations
- Peripheral
- Age related
Retinal Detachments
Toxic Retinopathies
Tumours
- Retinoblastoma

9. *Basic Neuro-Ophthalmology*

Anatomy
Pupillary Abnormalities
Oculo-Motor Paralysis
Visual Field Defects

10. *Systemic Diseases and the Eye*

Hypertension
Sickle cell disease
Malaria
Hereditary Disorders
- Albinism
- Phakomatosis (Neuro-ectodermal Disorders)
Infections
- Leprosy
- Onchocerciasis
- Trachoma
- Tuberculosis
- Measles

- Rubella
- HIV/AIDs
- Nutritional Eye Disease
 - Vitamin A Deficiency
- Endocrine Diseases
 - Diabetes Mellitus
 - Dysthyroid Eye Disease

D: BASIC MICROSURGICAL SKILLS

1. USE OF THE OPERATING MICROSCOPE

- What is an operating microscope
 - Structure of the microscope
 - *The body
 - *The binoculars
 - *The objective lens
 - Important features of a microscope
 - *The field of vision
 - *Lighting
 - *The working space
 - *The eye to field distance
 - *Mechanical focusing
 - *Variable magnification
 - *Zoom
 - *Other features
 - Types
 - Adjustment to the microscope
 - *The surgeon
 - *The eye piece setting
 - *The focusing control
 - *The Magnification

11. FOUNDATIONS OF OPHTHALMIC SURGERY

- Sterilisation and Sterile Techniques
 - Postoperative Infections
- Anaesthesia for eye surgery
 - Local
 - Retrobulbar, Periocular, Facial
 - General
- Ophthalmic Sutures and Other Consumables
 - Types of sutures
 - Surgical Management of common problems
 - Care of Eye instruments, Theatre Equipment and other equipment
 - Suturing techniques

III.WET/DRY LAB

- Suturing
- Step surgery
- Full ECCE+ PCIOL insertion/SICS+PCIOL
- Skills evaluation

END-OF-COURSE EXAMINATION

Examination Format:

- Written Examination
 - Paper1: MCQ-100 questions in 2 hours
 - Basic Sciences (25 questions)
 - Optics (25 questions)
 - Clinical ophthalmology (50 questions)
 - Paper II(Clinical/Surgical Ophthalmology): Essays in 3 hours - 5 questions
 - Paper 111(Optics) : Essay in 3 hours - - - - 5 questions
- Clinical Examination
 - Case for Refraction - - - 30 minutes, 15 minutes with examiners
 - OSCE - - - -
 - Long case(one) - - - 30 minutes, 15 minutes with the examiner
- **Viva Voce**
- Questions in all aspects of general ophthalmology to cover the subspecialities.
Duration: 30 minutes

CRITERIA FOR PASS

1. At least 50% is the pass mark
2. Pass in refraction
3. Pass overall
4. Pass in clinicals

3. CLINICAL SCIENCE CURRICULUM

Optics and refraction

All trainees must understand and apply knowledge of optics, ultrasound and electromagnetic wavelengths relevant to ophthalmic practice. They must have a basic understanding of medical physics. They must be able to use this knowledge when interpreting clinical symptoms, signs and investigations and in the practice of ophthalmic medicine and surgery.

PHYSICAL AND GEOMETRIC OPTICS:

Properties of light: Electromagnetic spectrum, wave theory, particle theory, diffraction, interference, resolution, polarisation, scattering, transmission and absorption, photometry, lasers

Reflection: Laws of reflection, reflection at a plane surface, reflection at curved surfaces

Refraction: Laws of refraction (Snell's Law), refraction at a plane surface, refraction at curved surfaces, critical angle and total internal reflection

Prisms: Definition, notation of prisms, uses in ophthalmology (diagnostic and therapeutic), types of prism

Spherical lenses: Cardinal points, thin lens formula, thick lens formula, formation of the image, vergence power (dioptric power), magnification, spherical decentration and prism power, lens form

Astigmatic lenses: Cylindrical lenses, Maddox rod, toric lenses, Conoid of Sturm, Jackson's cross cylinder Notation of lenses: Spectacle prescribing, simple transposition, toric transposition

Identification of unknown lenses: Neutralisation, focimeter, Geneva lens measure

Aberrations of lenses: Correction of aberrations relevant to the eye, Duochrome test

CLINICAL OPTICS

Optics of the eye: Transmittance of light by the optic media, schematic and reduced eye, Stiles-Crawford effect, visual acuity, contrast sensitivity, catoptric images, emmetropia, accommodation, Purkinje shift, pinhole.

Ametropia: Myopia, hypermetropia, astigmatism, anisometropia, aniseikonia, aphakia

Accommodative problems: Insufficiency, excess, AC/A ratio

Refractive errors: Prevalence, inheritance, changes with age, surgically induced

Correction of ametropia: Spectacle lenses, contact lenses, intraocular lenses, principles of refractive surgery

Problems of spectacles in aphakia: Effect of spectacles and contact lens correction on accommodation and convergence, effective power of lenses, back vertex distance, spectacle magnification, calculation of intraocular lens power, presbyopia

Low visual aids: High reading addition, magnifying lenses, telescopic aids - Galilean telescope

Instrument technology

All trainees must understand and apply knowledge of instrument technology relevant to ophthalmic practice. They must be aware of the limitations of technology and the risks involved in their use. They must be able to maintain an understanding of new developments in relevant technologies.

Direct and indirect ophthalmoscopes

Retinoscope

Focimeter
Simple magnifying glass (Loupe)
Lensmeter
Automated refractor
Slit-lamp microscope
Applanation tomography and tonometry
Keratometer
Specular microscope
Operating microscope
Zoom lens principle
Corneal pachometer
Lenses used for fundus biomicroscopy (panfunduscope, gonioscope Goldmann lens, Hruby lens, 90D lens, etc.)
Fundus camera
Lasers
Fields machines (Goldmann, Humphrey)
Retinal and optic nerve imaging devices (OCT, SLO, GDx)

4. CLINICAL OPHTHALMOLOGY

All candidates must understand and apply knowledge of medicine and surgery relevant to ophthalmic practice. They must understand the principles underlying contemporary ophthalmic practice and medical and surgical innovations. They must be aware of the breadth of ophthalmology and the sub-specialties within ophthalmology.

The scope of contemporary clinical ophthalmology is broad and the following list is indicative rather than exhaustive.

Orbital disease

- o Clinical anatomy
- o Lacrimal problems – secretory and drainage systems.
- o Orbital inflammation
- o Paranasal sinus disease
- o Orbital neoplasia
- o Orbital malformations

External eye disease

- o Clinical anatomy
- o Dry eye syndromes
- o Conjunctival infection
- o Conjunctival inflammatory, degenerative and neoplastic disease
- o Scleral and episcleral disease
- o Allergic eye disease
- o Abnormalities of tear film

Eyelid disorders

- o Clinical anatomy
- o Blepharitis and Meibomian gland dysfunction
- o Malpositions: entropion, ectropion and ptosis
- o Lid tumours

□ **Corneal disease**

- o Clinical anatomy, physiology and immunology
- o Keratitis
- o Corneal dystrophies and degenerations
- o Corneal ectasias

□ **Lens and cataract**

- o Clinical anatomy, physiology and biochemistry
- o Cataract
- o Abnormalities of lens shape and position

□ **Uveal disease**

- o Clinical anatomy, physiology and immunology
- o Uveitis
- o Primary and secondary uveal tumours
- o Choroidal effusion

□ **Medical retinal disease**

- o Clinical anatomy, physiology and immunology
- o Vascular retinopathies
- o Macular degeneration
- o Hereditary retinal disease
- o Retinal infection

□ **Glaucoma**

- o Clinical anatomy, physiology and pharmacology
- o Classification of glaucomas

□ **Ocular motility and strabismus**

- o Clinical anatomy and physiology
- o Binocularity
- o Strabismus
- o Myopathies
- o Developmental anomalies of binocularity, including amblyopia

□ **Neuro-ophthalmology**

- o Clinical anatomy and physiology
- o Optic nerve disease
- o Visual pathway disorders
- o Pupil abnormalities
- o Nystagmus
- o Headache
- o Diplopia
- o Ptosis
- o Cranial nerve palsies – particularly IInd, IIIrd, IVth, Vth, VIth and VIIth

□ **Paediatric ophthalmology**

- o Clinical anatomy and embryology
- o Child development and developmental delay
- o Congenital abnormalities
- o Cataract, glaucoma and retinal disease in children
- o Retinopathy of prematurity
- o Non-accidental injury

- o Assessment of the apparently blind baby/child
- o Systemic syndromes
- **Intraocular tumours**
- o Primary intraocular neoplasia
- o Secondary intraocular tumours
- o Non-metastatic effects of neoplasia
- **Surgical ophthalmology**
- o Anaesthesia – local and general
- o Surgical anatomy
- o Sterilization of instruments and equipment
- o Sutures and other materials used in ophthalmic surgery
- o Principles of wound design, construction and healing
- o Principles of wound closure, appropriate use of different suture materials and needle design
- o Intraocular lenses
- o Management of trauma
- o Cataract surgery
- o Endophthalmitis
- o Surgery for glaucoma
- o Vitreo-retinal surgery
- o Strabismus surgery
- o Oculoplastic surgery
- o Corneal surgery
- o Enucleation
- o Nasolacrimal and orbital surgery
- o Laser surgery – cornea, iris, vitreous, retina
- o Complications of surgery – general and specific
- o Use of human tissue for surgery (eye banking)

5. COMMUNITY OPHTHALMOLOGY – CEH curriculum

Four Modules:

Module I – Basic Epidemiology for needs assessment in Eye

Module II – Control of diseases

Modules III - Planning

Module IV - Information, Health Education & Communication

(Available at the WACS Secretariat)

6. RURAL POSTING

The trainee will be the manager of the eye care team in the region/district of a population of 250,000-500,000.

Generally, his duties will include the following:

- a. Clinical and surgical duties
- b. Training of ophthalmic assistants and integrated eye workers.

- c. Community eye care, including an awareness of community eye problems and provision of eye care services to both rural and urban population.
- d. Organisation and administration of regional/district eye care services within the health system
- e. Data management and application to local needs and conditions.
- f. Linkages –inter sectoral and services to irreversibly blind and low vision children and adults.

Specific expected Outcomes of the rural posting

1. Service delivery: A minimum of 75 cataract surgeries should be done, about 600 patients seen in the outpatient clinic and a further 1,000 seen on community outreach basis.
2. Operational research: He/She should have collected data for writing up a publishable paper. This paper should be included in the trainee's Portfolio .
3. At the end of this posting, the trainee is expected to have acquired the skills in the setting up and running of services for the eye health component of primary health care as well as the training of Primary level and community eye care workers or a secondary health centre.

4. During the rural posting the trainee is supposed to be able to perform and exhibit the following:

Community-Oriented

- i. Assessment of local eye care needs and resources
- ii. Formulation and management of eye care programmes
- iii. Mobilisation of resources and the community for implementation of the eye care programme
- iv. Integration of eye care into health and health- related delivery services
- v. Data collection and application.

Educational

- i. Diagnose and manage all the common eye conditions and the majority of blinding disorders
- ii. Perform the majority of basic eye operations including cataract, glaucoma and lid surgery
- iii. Play an effective leadership role within the regional/district health regions
- iv. Act as prevention of blindness managers for same

- v. Organise training for health and health related workers
 - Train ophthalmic nurses and ophthalmic medical assistants
 - Train integrated eye care worker
 - Train trainers of community-based workers (health and non- health)
 - Conduct of workshops for implementation of eye care programmes at district level

Managerial Skills

- i. Formulation and management of eye care programmes
- ii. Familiarisation with government rules, regulations and policies of health delivery
- iii. Personnel and resources management
- iv. Supervision and support of all eye health workers using the team approach
- v. Data collection and application
- vi. Report writing
- vii. Advocacy on eye health issues
- viii. Linkages with services for the irreversibly blind and low vision children and adults

Commencement: 2015/2016 with the membership programme commencing in 2014

Posting location

This 3 month rural posting shall be carried out in an identified primary level centre as arranged by the training institution.

Every accredited centre will provide as part of the requirements for the membership accreditation, a centre or group of centres that they work with (evidenced by an MOU) in the training and fulfilment of the rural posting requirement of the membership programme, or rural outreach posts of the base institution

Organisation of the rural posting

This rural posting will be organized by the primary training institution through a team of trainers including:

1. Consultant in Charge of secondary facility (If the position and person exists and is available)

2. Rural posting supervisor (which may be individualized per trainee).This could also be the consultant in charge of outreach activities in the department of the primary institution where there aren't many consultants or consultants in the primary institution could be rota-ed for weekly coverage of the rural clinic during the period of the posting
3. Residency training coordinator (In charge of the Ophthalmology training programme in the institution)
4. Head of Department (In Charge of the entire department and external relationships with the international bodies supporting projects, Federal governments departments who can facilitate the rural posting, state governments and ministry of health and others and local government and their primary health care agencies)

Posting timetable

This will be drawn up by the resident after he's been informed of where he'll be doing his rural posting.

The individual trainee's posting involves:

- a. Setting of goals and objectives based on the community he's going to and what he is expected to achieve
- b. Production of trainee's work time table(days of surgery, clinic, community visits/supervision, community training, advocacy etc).This should be prepared ahead of time.

Feedback to department

Regular and timely feedback on performance is essential to ensure the trainee is performing up to standard.

Supervision

-The overall supervision of the rural posting lies with the primary training institution, the consultant in charge of the rural clinic, clinical/community ophthalmology or rural posting supervisor, the Residency Training Co-ordinator and the Head of Department.

-The publishable paper should be supervised by two Fellows of not less than three years or two years postqualification or Members of not less than five years post qualification

Completion of the rural posting

For a candidate to be said to have successfully completed the rural postings, he should have completed the following:

1. The stipulated duration
2. The completed research
3. The rural portfolio with feed backs
4. Report including budget and especially the Log book with evidence of the cataract operation surgery (catops)log books and analysis of the catops forms of the posting by the residents (a template will be provided preferably a narrative)
5. Signed discharge by the consultant in charge of the rural facility if there is one present, the rural posting supervisor/ community outreach supervisor, residency training coordinator and HOD

Proposed assessment methods

1. During the rural posting with the consultant in charge if any, in clinic and theater

Competence in patient management and health promotion and disease prevention is assessed using Case based Discussion (CbD).

- a. Clinical Rating Scale (CRS) and Objectively Structured Clinical Examination (OSCE) will be used to assess the resident's clinical skills.
- b. Procedural skills will be assessed by Direct Observation of Procedural Skills (DOPS)
- c. Most of the "Attitudes, Ethics & Responsibilities" and Communication skills will be assessed using Multiple Source Feedback (MSF) where appropriate persons are approached to give feedback on the resident's performance.
- d. Technical skills will be assessed using Objectively Structured Assessment of Technical Skills (OSATS)
- e. Log Books (for surgeries, examination procedures, refraction, technical procedures) will be kept by each resident and regularly assessed by trainers

- g. By a publishable paper (Part of the rural posting portfolio)
- h. By Rural posting portfolio (Main submission to Faculty)

Sustainability

If, at the end of the rural posting there's no other trainee to be posted the centre the base hospital trainees should now be rota-ed to ensure regular coverage of the clinic or a member could be permanently posted to the clinic.

1. The rural eye care surgical facilities created should consider having a primary consultant eye physician and surgeon (ophthalmic surgeon) employed to work there by the state or federal government through a primary employment or seconded from a federal government institution.
2. The collaboration of the centres with the state or federal government hospital should be documented with responsibilities clearly spelt out for each member of the eye care team and the trainee.
3. Stipends for participating in the training and supervision of the rural posting (with evidence) should be given to the training team (the HOD, residency training coordinator, the rural posting supervisor or the community outreach supervisor, the consultant covering the rural eye care facility).
4. Stipends(rural posting allowance) should be given to trainees and other members of the eye care team(the optometrist, the ophthalmic nurse) that offer approved services in the designated rural facilities.

JOB DESCRIPTION

Rural Posting Supervisor

1. This is the Consultant that supervises the Rural Posting activities of the Resident in the Posting.
2. Should be a Consultant chosen/assigned to the trainee by the Departmental Board/HOD. It could rotate from one Consultant to another or depend on which Consultant is assigned to be in charge of Outreach centers.

3. It should preferably not be the Residency Training Coordinator but this is subject to the Departmental Board / peculiar prevailing circumstance.

4. To drive the commencement of the rural posting pending when the management system is put in place, the department or primary/base hospital could utilize a percentage of money generated from the rural posting to fund the travel costs of the Rural Posting Supervisor. They could also appeal to their Management for support.

The Residency training coordinator:

1. Will provide the resident with the information on the rural area he will be going to and also the profile of the area

2. Successful completion and passing of the CEH module is a prerequisite for going for the rural posting.

THE PUBLISHABLE PAPER TO BE WRITTEN BY THE TRAINEE

1. As regards Operational Research topics, the rural area should generate the questions the trainees would seek to answer with the research. In other words, the trainees would find out the eye problems/ eye care challenges of the community and try to solve it through a research.

2. Also, The research write up would include sections on

- Policy Change – How the Resident intends his/her findings to be disseminated and translated into Policy change and practice.
- Since the Research sought to meet a need of the community, the answers from the research should be given back to the community as policy change.

3. The whole write up should not exceed 40pages which should cover from ‘Introduction to Conclusion’.

The research topics should be: Community- based research preferably or Clinical studies. They should be Prospective studies. They may or may not be operational research or health systems research.

7. PATIENT INVESTIGATION (PI)

The resident will be expected to acquire the knowledge on how to investigate patients/interpretation of results during the clinical ophthalmology postings in base hospitals.

A. Orthoptic assessment

All candidates must be able to perform simple orthoptic assessment, where appropriate, and interpret the findings. They must understand the limitations of the investigations and the implications of positive or negative test results. They must be aware of the cost and resources involved.

- Interpretation and an understanding of the performance underlying basic science of the tests that make up a typical orthoptic report, including:
 - o Quantitative and qualitative assessment of vision (children & adults)
 - o Cover, cover-uncover test and alternate cover test
 - o Assessment of ocular movements
 - o Measurement of deviation
 - o Assessment of fusion, suppression and stereo-acuity.
 - o Knowledge of Hess Chart/Lees Screen, field of BSV and uniocular fields of fixation

B. Assessment of corneal shape, structure and thickness

All candidates must be able to order and interpret investigations to assess the cornea, although availability of equipment will vary in different units. They must be able to order and interpret basic tests. They must be able to interpret more complex investigations and be aware of specialised techniques. They must understand the purpose and limitations of the investigations and the implications of a positive or negative test result. They must be aware of the possible discomfort, distress and risks that the patient may be exposed to with the test as well as the cost and resources involved.

- Interpretation and an understanding of the performance underlying basic science of contemporary tests that are used in corneal practice, including:
 - o Keratometry
 - o Corneal topography
 - o Pachymetry
 - o Optical coherence tomography
 - o Specular and confocal microscopy
 - o Wavefront analysis

C. Biometry

All candidates must be able to order and interpret appropriate biometry investigations, particularly in relation to decision making in cataract surgery. They must understand the limitations of the investigation and the implications of an unusual result. They must be aware of the possible discomfort and distress and risks to which the patient may be exposed during the test as well as the cost and resources involved.

- Interpretation and an understanding of the performance and underlying basic science of contemporary tests that are used in ophthalmic practice, including
 - o Keratometry
 - o Axial length measurement
 - o IOL power calculation
 - o A constants
 - o Sources of biometric error
 - o Choice of post-operative refractive error
 - o Refractive error

D. Fields (automated, Goldmann)

All candidates must be able to order and interpret appropriate visual field investigations. They must understand the limitations of the investigation and the implications of a positive or negative test result. They must be aware of the possible discomfort and distress and risks to which the patient may be exposed during the test as well as the cost and resources involved.

- Interpretation and an understanding of the performance and underlying basic science of contemporary tests that are used in ophthalmic practice, including
 - o Humphrey and other automated perimeters and the common forms of statistical analysis generated
 - o Goldmann perimetry

E. Retinal and optic nerve imaging

All candidates must be able to order and interpret retinal and optic nerve investigations that require some form of image capture and analysis. They must be aware of new techniques as they are developed. They must understand the limitations of the investigations and the implications of a positive or negative test result. They must be aware of the possible discomfort, distress and risks that the patient may be exposed to involved with the test as well as the cost and resources involved.

- Interpretation and an understanding of the performance and underlying basic science of contemporary tests that are used in retinal practice, including:
 - o Retinal photography
 - o Optical coherence tomography
 - o Scanning laser ophthalmoscopy

F. Ocular angiography

All candidates must be able to order, describe and interpret ocular angiograms. They must understand the purpose and limitations of the investigation and the implications of a positive or negative test result. They must be aware of the possible discomfort, distress and risks that the patient may be exposed to involved with the test as well as the cost and resources involved.

- Interpretation and an understanding of the performance and underlying basic science of contemporary angiographic tests that are used in retinal practice, including: Fluorescein and indocyanine green angiography

G. Ultrasonography

All candidates must be able to order and interpret appropriate ocular, orbital and other relevant ultrasound measurements and images. They must understand the limitations of the investigation and the implications of a positive or negative test result. They must be aware of the possible discomfort and distress to which the patient may be exposed during the test as well as the cost and resources involved.

- Interpretation and an understanding of the performance and underlying basic science of contemporary ultrasound tests that are used in ophthalmic practice, including:
 - o A and B scans
 - o Ultrasound biomicroscopy
 - o Doppler ultrasound

H. Radiology and other neuro-imaging

All candidates must be able to order and interpret appropriate radiological and related investigations. They must understand the limitations of the investigation and the implications of a positive or negative test result. They must be aware of the possible discomfort and distress and risks to which the patient may be exposed during the test as well as the cost and resources involved.

- Interpretation and an understanding of the performance underlying basic science of contemporary tests that are used in radiological practice, of relevance to the practice of ophthalmology, including:
 - o Plain skull and chest X ray
 - o Orbital and neuro-CT scans
 - o Orbital and neuro-MRI scans
 - o Neuro-angiography

I. Ocular Electro-diagnostic tests

All candidates must be able to order and interpret appropriate electrodiagnostic tests. They must understand the limitations of the investigation and the implications of a positive or negative test result. They must be aware of the possible discomfort and distress and risks to which the patient may be exposed during the test as well as the cost and resources involved

- Interpretation and an understanding of the performance and underlying basic science of contemporary tests that are used in ophthalmic practice, including:
 - o Electroretinography
 - o Electrooculography
 - o Visually evoked potentials

J. Biochemistry

All candidates must be able to order and interpret appropriate biochemical investigations and recognise when further action is required. They must understand the limitations of the investigation and the implications of a positive or negative test result. They must be aware of the possible discomfort and distress and risks to which the patient may be exposed during the test as well as the cost and resources involved.

- Interpretation and an understanding of the performance and underlying basic science of contemporary tests that are used in ophthalmic practice, including
 - o Liver and renal function tests
 - o Blood glucose
 - o Cardiac enzymes
 - o Acid-base balance
 - o Blood gases
 - o Thyroid function tests

K. Haematology

All candidates must be able to order and interpret appropriate haematology investigations and recognise when further action is required. They must understand the limitations of the investigation and the implications of a positive or negative test result. They must be aware of the

possible discomfort and distress and risks to which the patient may be exposed during the test as well as the cost and resources involved.

Interpretation and an understanding of the performance and underlying basic science of contemporary tests that are used in ophthalmic practice, including

- o Clotting screens
- o Blood count
- o Blood transfusion
- o ESR, CRP and blood viscosity

L. Pathology

All candidates must be able to order and interpret appropriate pathology investigations and recognise when further action is required. They must understand the limitations of the investigation and the implications of a positive or negative test result. They must be aware of the possible discomfort and distress and risks to which the patient may be exposed during the test as well as the cost and resources involved

- An understanding of the performance and underlying basic science of contemporary tests that are used in ophthalmic practice, including
 - o Types of biopsy
 - o Transport of specimens
 - o The law in relation to human tissue

M. Microbiology

All candidates must be able to order and interpret appropriate microbiology investigations and recognise when further action is required. They must understand the limitations of the investigation and the implications of a positive or negative test result. They must be aware of the possible discomfort and distress and risks to which the patient may be exposed during the test as well as the cost and resources involved.

- Interpretation and an understanding of the performance and underlying basic science of contemporary tests that are used in ophthalmic practice, including
 - o Collection of samples for virology, bacteriology, mycology, parasitology
 - o Corneal scrapes
 - o Conjunctival swabs
 - o Intra-ocular samples
 - o Sampling for MRSA and other important hospital acquired infections
 - o Know how to set up and use side laboratory in the eye unit

N. Immunology and allergy testing

All candidates must be able to order and interpret appropriate immunology and allergy investigations and recognise when further action is required. They must understand the limitations of the investigation and the implications of a positive or negative test result. They must be aware of the possible discomfort and distress and risks to which the patient may be exposed during the test as well as the cost and resources involved

- Interpretation and an understanding of the performance and underlying basic science of contemporary tests that are used in ophthalmic practice, including
 - o Auto-antibodies
 - o HLA antigens

- o Patch/allergy tests

O. Urinalysis

All candidates must be able to order and interpret appropriate urinalysis and recognise when further referral is required. They must understand the limitations of the investigation and the implications of a positive or negative test result.

- Interpretation and an understanding of the performance and underlying basic science of contemporary tests that are used in ophthalmic practice, including
 - o Proteinuria
 - o Haematuria

P. Bone scans

All candidates must know when it is appropriate to order bone scans as part of bone protection in long term steroid use. They must recognise when action is required based upon the report. They must understand the limitations of the investigation and the implications of a positive or negative test result. They must be aware of the possible discomfort and distress and risks to which the patient may be exposed during the test as well as the cost and resources involved..

- Interpretation and an understanding of the performance and underlying basic science of contemporary tests that are used in ophthalmic practice, including DEXA-scans

8. Patient Management (PM)

This should be consolidated during the trainee's clinical ophthalmology postings.

Visual standards

All candidates must know and be able to interpret the visual standards for driving. They must be able to locate published guidance and advise a patient on occupational visual standards. They must be able to respond appropriately to requests for information about a patient's vision from the relevant authority.

- Basic knowledge and understanding of the visual standards of fitness to drive in the individual's country.

Therapeutics

All candidates must understand and apply knowledge of clinical therapeutics relevant to ophthalmic practice. They must be able to use this knowledge when prescribing for a patient. They must understand the therapeutics used in general medicine and surgery to a basic standard. They must be aware of the possible ocular effects of systemic medications and systemic effects of ocular medications.

- Principles of ocular pharmacology
- Anaesthetic agents
- Anti-infective drugs
- Glaucoma medication
- Anti-inflammatory drugs
- Lubricants
- Visco-elastics
- Mydriatics and miotics
- Immuno-suppressants and cytotoxic drugs used in ophthalmic practice
- Dyes used in ophthalmology

- Drugs used for retinal and macular disease
- Role of preservatives
- Treatment of diabetes, hypertension, respiratory disease, cardiovascular disease
- Anti-platelet drugs and anti-coagulants
- Side effects of ocular medications
- Ocular side effects of systemic medication

Laser

All candidates must understand and apply knowledge of lasers relevant to ophthalmic practice. They must be able to use this knowledge when recommending laser treatment in the practice of ophthalmic medicine and surgery. They must be fully versed in local laser safety procedures.

- Laser physics
- Types of medical lasers of use in ophthalmology
- Biological effects of lasers
- Laser safety

Spectacle lenses

All candidates must be able to identify when a patient may benefit from the use of spectacle lenses and prisms. They must be able to assess the type and strength of lens or prism and provide an appropriate prescription. They must be able to advise a patient on the purpose, duration and optical effects of the prescription. They should be able to liaise with optometrists and orthoptists, where available.

- Correction of ametropia and presbyopia using spectacle lenses
- Monofocal, multifocal and varifocal lenses
- Use of prisms

Contact lenses

All candidates must be able to recommend the use of contact lenses when indicated by the patient's clinical problem. They must be able to make an appropriate referral and make appropriate provision for the patient to be reviewed. They must be able to advise on basic contact lens care and be able to recognise and manage the complications of contact lens use.

- Types of contact lenses
- Contact lens solutions
- Indications for contact lens use in ophthalmic practice
- The basics of contact lens fitting
- Management of contact lens complications

Diet and nutrition

All candidates must understand how dietary deficiencies and nutritional problems can lead to ophthalmic disease. They must be able to manage the patient appropriately, by prescription of supplements or referral for expert advice. They must be able to advise a patient on the role of nutritional supplements in the management of ophthalmic disease

- Vitamin deficiency
- Ocular consequences of alcohol, tobacco and drug abuse
- Malnutrition
- Use of nutritional supplements in ophthalmology

Ocular Manifestations of Systemic diseases

All candidates must be able to recognise when a patient's ocular problem is a manifestation of a systemic disorder. They must be able to explain this to the patient and make appropriate arrangements for further management.

- Medical retinal disorders including diabetic retinopathy and hypertensive retinopathy
- AIDS-related opportunistic infections
- Cardiovascular disorders relevant to ophthalmology
- Respiratory disorders relevant to ophthalmology
- Rheumatological disorders relevant to ophthalmology
- Skin disorders relevant to ophthalmology
- Endocrine and metabolic disorders relevant to ophthalmology
- Chromosomal disorders relevant to ophthalmology
- Phacomatoses
- Ocular toxicology
- Systemic associations with ophthalmic disease
- Neurological disorders relevant to ophthalmology

General Medicine and Neurology

All candidates must understand and apply knowledge of general medicine and surgery relevant to ophthalmic practice. They must be able to recognise when a patient is seriously ill and make appropriate arrangements for the patient's care.

Knowledge, to **the level of a newly qualified doctor**, is expected in the following areas:

- Sexually transmitted diseases
- Infectious diseases
- Gastroenterology, hepato-biliary and pancreatic disease
- Haematological diseases and medical oncology
- Rheumatology
- Renal disease and basic fluid and acid-base balance
- Cardiovascular and respiratory disease
- Endocrinology and diabetes
- Neurological disease
- Dermatology
- Emergency medicine – ability to recognize the ill patient
- Management of acute emergencies – anaphylaxis, hypo/hyperglycaemia, the unconscious patient and cardiac and respiratory arrest

Psychology

All candidates must understand and apply knowledge of clinical psychology relevant to ophthalmic practice. They must understand the psychology of vision to a basic standard and how psychological problems can become manifest with ophthalmic symptoms. They must be able to recognise when a patient's mental state is disturbed and make appropriate arrangements for the patient's care.

- Psychiatric disorders

- Psychiatric aspects of ophthalmic diseases
- Medically unexplained symptoms
- Alcohol and drug misuse
- Organic mental disorders
- Dementia
- Mental incapacity and consent

Sociology

All candidates must understand and apply knowledge of medical sociology relevant to ophthalmic practice. They must understand how social problems can influence ophthalmic symptoms. They must be able to refer a patient for appropriate social services support.

- Child protection
- Visual impairment
- Social Services Framework
- Driving and vision

Epidemiology/Evidence Based Medicine

All candidates must understand and apply knowledge of clinical epidemiology and evidence based medicine relevant to ophthalmic practice. They must be able to use this knowledge during clinical assessment, interpreting investigations and planning clinical management for a patient.

- Epidemiological principles
- Screening
- Burden of ocular disease
- Sensitivity, specificity, numbers needed to treat/harm
- Best evidence for practice
- Critical assessment of published evidence

Instruments

All candidates must understand and apply knowledge of instrument technology relevant to ophthalmic practice. They must be aware of the limitations of technology and the risks involved in their use. They must be able to maintain an understanding of new developments in relevant technologies

- Surgical instruments
- Instruments used in clinics

Statistics

All candidates must understand and apply knowledge of statistics relevant to ophthalmic practice. They must be able to use this knowledge in the interpretation and publication of research

- Descriptive statistics (central tendency, dispersion, proportion, confidence intervals)
- Inferential statistics (parametric and non-parametric hypothesis tests, correlation and regression, statistical significance)
- Risk (relative and absolute risk, hazard and odds ratios)

Genetics

All candidates must understand and apply knowledge of clinical genetics relevant to ophthalmic practice. They must be able to use this knowledge when advising patients about patterns of inheritance. They must recognise when it is appropriate to refer a patient for genetic counseling. They must recognise when it is important to offer a consultation with family members.

- Basic molecular genetics
- Inheritance patterns
- Inherited eye diseases
- Genetic counseling

Economics

All candidates must understand and apply knowledge of health economics relevant to ophthalmic practice. They must understand how ophthalmic services are planned and managed within the health service.

- Health policy
- Effectiveness of health care interventions
- Econometrics

APPENDICES

APPENDIX 1: RECOMMENDED TEXT/READING MATERIALS

BASIC SCIENCES

1. Training centre library books
2. Anatomy - - - - - Last JR
3. Davson's Physiology of the Eye
4. Immunology Roitt or Essential Immunology Blackwell
5. Genetics - - - - - Emery and Mueller
6. Elements of Medical Genetics
Churchill Livingstone
7. Pharmacology - - - - - -Rang and Dale
8. Pharmacology Churchill Livingstone,
9. Greer's Ocular Pathology by - - - - - - David R. Lucas
10. Clinical anatomy of the eye - - - - - - Snell and Lemp
11. Adler's physiology of the eye-Adler's

SURGICAL OPHTHALMOLOGY

1. Stallards Eye Surgery - - - - - - by Roper-Hall
2. Ophthalmic Plastic Surgery - - - - - - by S. A Fox
3. Elements of Ophthalmology Applied to the
Practice of Tropical Medicine - - - - - - by Chovet.,
Lucquiaud, J. Vedy. J.
4. Eye Surgery in Hot Climates-- - - - - - - Sandforth Smith
5. General Surgery at the District Hospital - - - - - - by J. Cook; B
Sankaran and
Wasunna – WHO.
6. General Anaesthesia at the District Hospital

OPTICS AND REFRACTION

1. Clinical Optics - - - - - - Elkington
2. Practice of refraction - - - - - -Duke Elder
3. Clinical refraction - - - - - - American Academy
Series
4. A basic guide to practical refraction for
new residents in Ophthalmology - - - - - - Chimdi Chuka-
Okosa

CLINICAL/MEDICAL OPHTHALMOLOGY

1. Principles of Ophthalmology - - - - - - Kanski
2. Ophthalmology Principles and Concepts - - - - - - Newell F
3. Eye Diseases in Hot Climates - - - - - - Sandforth Smith
4. Epidemiology of Eye Diseases - - - - - - Gordon Johnson et
al

5. Clinical Ophthalmology(also in CDs)	-	-	-	-	Duke Elder's
6. Clinical Ophthalmology	-	-	-	-	Albert and Jakobiec
7. Clinical Ophthalmology	-	-	-	-	Goldberg and Peyman
8. American Academy series	-	-	-	-	All volumes

Appendix 11: SURGICAL REQUIREMENTS

Surgical Procedures					Nos.
1.	Cataract (with minimal or no supervision)	-	-	-	60
2.	Capsulotomy (YAG Laser)	-	-	-	10
3.	Trabeculectomy	-	-	-	10
4.	Lid Lacerations	-	-	-	10
5.	Entropion	-	-	-	10
6.	Ectropion (if available)	-	-	-	5
7.	Tarsorrhaphy	-	-	-	5
8.	Pterygium	-	-	-	10
9.	Anterior Scleral Suturing/Corneal Suturing	-	-	-	10
10.	Removal of Cornea / subtarsal foreign bodies	-	-	-	5
11.	Conjunctival flaps	-	-	-	5
12.	Paracentesis	-	-	-	10
13.	Evisceration	-	-	-	5
14.	Enucleation	-	-	-	5
15.	Orbital abscess-incision and drainage in adults	-	-	-	5
16.	Chalazion-incision and curettage	-	-	-	10
17.	Syringing and Probing	-	-	-	5
18.	EUA and Refraction (if possible)	-	-	-	10
19.	Others(specify) eg Strabismus surgery	-	-	-	3

APPENDIX 111: REFRACTION

<i>Error of refraction</i>							<i>Nos</i>
a. Myopia	-	-	-	-	-	-	30 cases
b. Hypermetropia	-	-	-	-	-	-	20 cases
c. Presbyopia	-	-	-	-	-	-	50 cases
d. Astigmatism	-	-	-	-	-	-	20 cases
e. Pseudophakia/aphakia	-	-	-	-	-	-	50 cases
f. Children(Cycloplegic refraction)	-	-	-	-	-	-	10 cases

APPENDIX 1V: CONTENTS OF PORTFOLIO

1. Logbook containing signed Surgeries, Refractions etc
2. Publishable paper
3. Certificate of courses attended
4. Letter of Certification of Rural Posting
5. Papers presented at departmental clinical meetings – Minimum of 5
6. Cases presented in clinics – minimum of 5
7. Write up of interesting/ challenging cases managed – Minimum of 5
8. Formative assessment papers.

APPENDIX V: ASSESSMENT FORMS

A: Refraction Skills assessment form

INSTRUCTION: TICK ✓ in the appropriate box

RESIDENT'S NAME:

ASSESSOR:

YEAR OF ENTRY INTO RESIDENCY PROGRAMME..... DATE:

Level: 1.....

1-Does not meet expectation; 2 -meets some expectation; 3-meets all expectations

4- Exceeds all expectations.

A. HISTORY-TAKING SKILLS	PERFORMANCE				
	1	2	3	4	NA
Introduced Self					
Obtained patient's personal data					
Obtained chief complaint					
History of presenting complaint					
Past ocular/Medical history					

Family ocular/medical history					
Drug/Allergy history					
B. EXAMINATION SKILLS					
Unaided distant visual acuity					
Aided distant visual acuity					
Pinhole distant visual acuity					
Unaided near visual acuity					
Aided near visual acuity					
Determination of power of spectacle correction					
Ocular motility					
Hirschberg's test					
Cover/uncover tests					
Convergence insufficiency					
Examination of the anterior segment					
Slitlamp biomicroscopy					
Tonometry					
Fundoscopy					
C. RETINOSCOPY SKILLS					
Properly placed trial frame on patient's face					
Dimmed the room light					
Well positioned to examine patient					
Instruct patient to fixate at a distance					
Gross retinoscopy at working distance					
Subjective retinoscopy					
Duochrome chart					
Jackson cross Cylinder					
Astigmatic fan					
Presbyopic correction					
Assessment of range of vision with correction					
IPD (Near, Distance)					
Back vertex distance					
Segment height					
Discussion with pt on type of (presbyopic) glasses					
D. WRITING OF PRESCRIPTION					
Clear					
Has all relevant measurements					
Has instructions for patient					
Adequate spectacle specifications					
E. CASE PRESENTATION					
Clear and concise					
Pertinent facts					

Accurate prescription					
Response to attending questions					

Comments: _____

Signed:

Supervisor _____

Resident _____

B: SURGICAL SKILLS ASSESSMENT FORM

TREATMENT OF INTRAOCULAR STRUCTURES				
1. Frequently used unnecessary force or caused damage by inappropriate use of instruments	2	3 Careful handling of intraocular tissues but occasionally caused inadvertent damage	4	5 Appropriate handling of intraocular tissues with no damage to ocular tissue
TIME, MOTION AND ENERGY				
1 Many unnecessary movements Entered and exited eye needlessly	2	3 Efficient time/ motion/energy but some unnecessary moves	4	5 Clear economy of movements and maximum efficiency by conserving intraocular motion and energy
EYE POSITION AND MICROSCOPE USE				
1 Constantly required re-centration and/or re-focusing of microscope	2	3	4	5 Kept the eye centered, maintained good view with microscope
INSTRUMENT HANDLING AND USE OF NON-DOMINANT HAND				
1 Repeatedly makes tentative, awkward or inappropriate movements with instruments	2	3 Competent use of instruments but occasionally stiff or awkward	4	5 Fluid moves with instrument and no awkwardness, conserving intraocular movement
KNOWLEDGE OF INSTRUMENTS AND EQUIPMENT				
1 Frequently asked for wrong instruments or used inappropriate instruments. Unaware of proper equipment settings	2	3 Knew names of most instruments and used appropriate tool for task	4	5 Obviously familiar with the instruments and equipment
FLOW OF OPERATION				
1 Frequently seemed unsure of surgical plan	2	3 Demonstrated some forward planning with reasonable progression the procedure	4	5 Planned course of operation effortlessly from one move to next
KNOWLEDGE OF SPECIFIC OR NEW PROCEDURE OR TECHNIQUE				

1 Require specific instruction at most steps	2	3 Knew all important steps of the operation	4	5 Familiar with all aspects of the operation
INTER ACTION WITH ASSISTANTS/SCRUB NURSES				
1 Failed to request or use assistance when needed	2	3 Appropriate use of assistance most times	4	5 Strategically used assistants to the best advantage at all times
HANDLING OF UNEXPECTED INTRAOCULAR EVENTS				
1 Unable to recognize adverse events or unable to request proper assistance.	2	3 Professional and competent identification of event. Able to request appropriate assistance	4	5 Superior independent management of event
OVERALL PERFORMANCE				
1 Unable to perform operation independently	2	3 Competent, could perform operation with min assistance	4	5 Clearly superior, able to perform operation independently and with confidence

RESIDENT

SUPERVISOR

APPENDIX VI: EXTERNAL POSTINGS

A: ENT Posting

Learning points

1. Understand the anatomy of paranasal sinuses and other structures around the ocular adnexa
2. Understand the development of the orbit in relation to the sinuses and the nasal cavity
3. Understand the normal drainage of tears in relation to the nasal cavity
4. Study the aetiopathogenesis of the common diseases of the paranasal sinuses as they affect the orbit e.g. mucocoeles and their management
5. Understand the basis of spread of infections from the nostrils/sinuses to the orbit
6. Understand the common causes of orbital cellulitis
7. Study the common ENT tumors that affect the eye and orbit and the principle of their management

B: NEUROSURGERY AND NEUROLOGY Postings

Learning points

1. Understand the general outlay of the brain, brainstem and location of the cranial nerve nuclei
2. Revise the course of the cranial nerves, the sympathetic nervous and parasympathetic nervous systems
3. Relate the various cranial nerves to one another and clinical signs resulting from their affectation
4. Revise the anatomy of the visual pathway and the organs in close relation to it
5. Understand the basis for and types of visual field changes in various diseases of the brain and visual pathway.
6. Understand the general principles of skull x-rays, brain CT Scans and MRI
7. Have an understanding of how to read and interpret skull x-rays, CT Scans and MRI
8. Revise the diseases of the cranial cavity that affect the eye/vision
9. Correlate the pupillary response with disease conditions affecting the visual pathway
10. Understand the pathogenesis of the ocular complications of head injury
11. Understand the supranuclear control of eye movements and the manifestations in pathologic states
12. Understand the aetiology and pathophysiology of headaches
13. Understand the aetiology and management of Ptosis
14. Understand the neurological manifestations and management of suprasellar/sellar tumours

CURRICULUM FOR THE FELLOWSHIP PROGRAMME

PREAMBLE

The Fellowship will likely commence in October/November 2017.

The fellowship programme of the faculty currently in use will run concurrently with this new curriculum until it is phased out around 2020/21.

This new fellowship will be purely a subspecialty training programme.

The candidate will specialize in one of the following subspecialty areas:

- a. Anterior segment and cornea
- b. Glaucoma
- c. Paediatric Ophthalmology and strabismus
- d. Retina and Vitreous
- e. Oculoplastic surgery
- f. Neuroophthalmology

A. Entry Requirements for Fellowship Training

i)

- Must be registered and in good standing with Medical and Dental Council
- Candidate must possess a membership or equivalent
- Candidates can progress directly from membership but One year experience(postmembership) an advantage
- Must produce recommendations from 2 referees
- Must pass selection exam/ interview

ii) **Fellowship objectives**

- Prepare to be a trainer
- Prepare to be a specialist: Exposure to subspecialties
 - Public health component of each subspecialty
- Prepare to be a researcher
 - A dissertation
- Courses
 - Management
 - Research methodology
 - Communications – training methods and skills

B. Expected outcomes of the fellowship programme

1.To produce a subspecialist that can deliver specialist ophthalmic care in response to the ocular pathology

2. To produce a specialist in a subspecialty area with the requisite amount of knowledge, skills and attitudes who is capable of independent subspecialty practice
3. He/she should be able to contribute to his subspecialty through publications and is expected to participate in the training of postmembership trainees under him

C. Duration of Training

- i. The duration shall be two (2) years, full-time, for the award of Fellowship of the College.

D. Course content

This will depend on the area of subspecialty.

