

COMPETENCY BASED POST GRADUATE (PG) MEDICAL EDUCATION IN OPHTHALMOLOGY, KING GEORGE'S MEDICAL UNIVERSITY, LUCKNOW

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training. To achieve this, it is necessary to standardize ophthalmology teaching at post graduate level throughout the country so that it will benefit in achieving uniformity in post graduate and undergraduate teaching as well as result in creating competent ophthalmic surgeons with appropriate expertise. Following document aims to outline the objectives and curriculum for postgraduate teaching along with the competencies to be acquired by students during the course of the postgraduate program in Ophthalmology at King George's Medical University (KGMU), Lucknow. The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment.

POST GRADUATE PROGRAM OBJECTIVES

The ophthalmology post graduate training program at KGMU is intended at developing in a student a blend of qualities that of a clinical specialist, a teacher and a researcher. The program is aimed to inculcate the following qualities, knowledge and skills in a post graduate student:

1. The student should develop a holistic attitude in patient management by acquiring understanding of the structure, function and development of the human body along with systemic alterations affecting eye.
2. The student should be able to practice and handle most day-to-day problems independently in ophthalmology. The student should also be aware of the limitations in his/her own clinical knowledge and know when to seek further help.
3. The student should understand the effects of environment on health and be familiar with the epidemiology of at least the more common diseases in the field of ophthalmology.
4. The student should be well versed in integrating the preventive methods with the curative and rehabilitative measures in the comprehensive management of the disease. The student should also be aware of various national programs combating blindness and how to extend their benefits to the patients.
5. The student should be familiar with common eye problems occurring in rural areas and be able to deal with them effectively. The student should also be aware of practice of telemedicine and mobile ophthalmic unit and their role in extending comprehensive eye care to the remote areas.
7. The student should be abreast with the current developments in Ophthalmic Sciences.
8. The student should be able to identify a problem for research, plan a rational approach to its solution, execute it and critically evaluate his/her data in the light of existing knowledge. The student should be able to critically evaluate scientific papers and judiciously use their findings while practicing evidence based medicine.

10. The student should be able to satisfactorily counsel and take informed consent from patient for various ophthalmic procedures. He/she also possess basic knowledge and understanding of medico-legal aspects of medicine.

SYLLABUS

These are only broad guidelines and are illustrative; there may be overlap between sections.

- I. Basic Sciences:
 - a. Orbital and ocular anatomy (Gross anatomy, Histology& Embryology)
 - b. Ocular Physiology
 - c. Ocular Pathology
 - d. Ocular Biochemistry General biochemistry, biochemistry applicable to ocular function
 - e. Ocular Microbiology General Microbiology, specific microbiology applicable to the eye
 - f. Immunology with particular reference to ocular immunology
 - g. Genetics in ophthalmology 8. Community Eye Health
- II. Optics:
 - a. Basic physics of optics
 - b. Applied optics including optical devices
 - c. Disorders of Refraction
- III. Clinical Ophthalmology:
 - a. Disorders of the lids
 - b. Disorders of the lacrimal system
 - c. Disorders of the Conjunctiva
 - d. Disorders of the Sclera
 - e. Disorders of the Cornea
 - f. Disorders of the Uveal Tract
 - g. Disorders of the Lens
 - h. Disorders of the Retina
 - i. Disorders of the Optic Nerve and Visual Pathway; Neuro-ophthalmology
 - j. Disorders of the Orbit
 - k. Glaucoma xiii. Paediatric ophthalmology
 - l. Ocular involvement in systemic disease
 - m. Immune ocular disorders
 - n. Strabismus
 - o. Ocular Oncology
- IV. Basics of biostatistics and research methodology.

OPHTHALMOLOGY COMPETENCIES

A post graduate student upon successful completion of the training in ophthalmology should be able to offer to the community, the current quality of 'standard of care' in ophthalmic diagnosis as well as therapeutics, medical or surgical, in most of the common situations encountered at the level of health services. At the same time the student should also be able to play the role of a leader, communicator, researcher and a teacher in the community to fulfil the responsibilities desired of him/her. To aid the student to carry out the aforementioned responsibilities, following competencies in cognitive, affective and psychomotor domains are to be nurtured in a student over the 3 years PG course duration.

A. COGNITIVE DOMAIN

1. Basic Medical Sciences

Develop understanding of the structure and function of the eye and its parts in health and disease. The student should be able to apply and integrate knowledge of other systems in body with functioning of the eye including the structure and function of the parts of central nervous system. The student should develop understanding and competence in performing/interpreting common laboratory procedures employed in diagnosis and research in ophthalmology.

2. Clinical Ophthalmology

The student will be given adequate opportunity to work, on the basis of graded responsibilities, in outpatients, in patient, and operation theatres (on a rational basis). Thus, from the day of entry to the completion of the training program, the student shall be able to:

- i. Acquire scientific and rational approach to the diagnosis of ophthalmic cases.
- ii. Acquire understanding of, and develop inquisitiveness to investigate, cause and effect of diseases.
- iii. Manage and treat all types of ophthalmic cases
- iv. Competently handle all ophthalmic medical and surgical emergencies
- v. Competently handle and execute safely all routine surgical procedures on lens, glaucoma, lid, sac, adnexa, retina and extra ocular muscles.
- vi. Be familiar with micro-surgery and special surgical techniques
- vii. Demonstrate knowledge of the pharmacological aspects (including toxicity) of drugs used in ophthalmic practice, and of drugs commonly used in general diseases that affect the eyes.

3. Refraction

- i. Acquire competence in assessment of refractive errors and prescription of glasses for all types of refraction problems in children and adult.
- ii. Acquire basic knowledge of manufacturing and fitting of glasses and competence of judging the accuracy and defects of the dispensed glasses.
- iii. Acquire basic knowledge of types, manufacturing and fitting of contact lens.

4. Ophthalmology Sub-Specialties

The student will be given an opportunity to work on a rotational basis in various speciality clinics of sub-specialties of ophthalmology. The student shall be able to:

- i. Examine, diagnose and demonstrate understanding of management of the problems of neuro-ophthalmology, and refer appropriate cases to neurology and neuro-surgery.
- ii. Examine, diagnose and demonstrate understanding of management of (medical and surgical) diseases in the field of (a) lens, (b) uvea, (c) cornea including transplant (d) retina including retinal detachment (e) squint (f) oculoplasty and tumors of eye (g) glaucoma (h) plastic surgery of eye
- iii. To demonstrate understanding of the manufacture, and competence in prescribing and dispensing of low visual aids and ocular prosthesis

5. Ophthalmic Pathological/Microbiological/Biochemicalsciences/Radiology

The student should be able to reach the diagnosis/diagnoses after interpreting the reports in correlation with the clinical profile of the patient.

6. Community Ophthalmology

Eye camps may be conducted where the PG students are posted for imparting training to according to a set methodology. Postgraduate students will be posted to assist in the conduct of eye camps; community and school surveys may also be conducted by them. They shall be able to guide rehabilitation workers in the organization and training of the blind in the art of daily living, and in the vocational training of the blind, leading to their gainful employment.

7. Research

To be able to perform quality research and apply their findings in clinical practice is an important aspect of post graduate training. The student should be able to perform literature search and identify a possible lacuna in understanding to raise a pertinent research question. The student should also be able to generate a hypothesis, draft the study objectives, formulate a research methodology, collect and analyse data and draw meaningful conclusions. The student should acquire basic knowledge and understanding of bio-statistics and should be able to apply the same in conducting clinical research. The student should also be aware of the ethical considerations in conducting research and publication. The student must write a thesis and at least one scientific paper during the course.

B. AFFECTIVE DOMAIN

This is one of the most important facet of post-graduate learning. The attitude and behaviour of a doctor complements their clinical skills and following attributes will be nurtured in a student during the phase of post graduate learning. The student:

- i. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
- ii. Always adopt ethical principles and maintain proper etiquette in dealings with patients, be compassionate and sympathetic to relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
- iii. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

C. PSYCHOMOTORDOMAIN

At the end of the course, the student should acquire following clinical skills:

➤ **EXAMINATION TECHNIQUES ALONG WITH INTERPRETATION**

1. Slit lamp Examination

- i. Diffuse examination
- ii. Focal examination
- iii. Retroillumination – direct and indirect
- iv. Sclerotic scatter
- v. Specular reflection
- vi. Staining modalities and interpretation

2. Fundus evaluation

- i. Direct/Indirect ophthalmoscopy
- ii. Fundus drawing
- iii. 3-mirror examination of the fundus
- iv. 78-D/90-D/60-D examination
- v. Amsler's charting

➤ **BASIC INVESTIGATIONS ALONG WITH THEIR INTERPRETATION**

- i. Tonometry: Tonometry - Applanation/Indentation/Non-contact
- ii. Gonioscopy:Gonioscopy grading of the anterior chamber angle
- iii. Tear/ Lacrimal function tests: Staining- fluoresce in and Rose Bengal;Schirmer test/tear film break uptime; Syringing;Dacrocystography
- iv. Corneal: Corneal scraping and cauterization ; Smear preparation and interpretation (Gram's stain /KOH) ; Medainoculation ;Keratometry -

- performance and interpretation ; Pachymetry ; Corneal topography – if available
- v. Colour Vision evaluation: Ishihara pseudoisochromatic plates ;Farnsworth Munsell, if available
 - vi. Refraction: Retinoscopy- Streak/ Priestley Smith; Use of Jackson's cross-cylinder; Subjective and objective refraction; Prescription of glasses
 - vii. Diagnosis and assessment of Squint: Ocular position and motility examination; Synoptophore usage; Lees screen usage ;Diplopia charting; Assessment of strabismus - cover tests/prisms bars; Amblyopia diagnosis and treatment; Assessment of convergence, accommodation, stereopsis, suppression
 - viii. Ex ophthalmometry: Usage of Hertel's exophthalmometer - proptosis measurement
 - ix. Contact lenses: Fitting and assessment of RGP and soft lenses; Subjective verification of over refraction; Complications arising of contact lens use ; Educating the patient regarding CL usage and imparting relevant knowledge of the complications arising thereon
 - x. Low Vision Aids: Knowledge of basic optical devices available and relative advantages and disadvantages of each; basics of fitting with knowledge of availability & cost.

The post graduate must be well versed with the following investigative modalities although the student may or may not perform it individually. But, she/he should be able to interpret results of the following tests:

- i. Fundus photography
- ii. Fluorescein angiography
- iii. Ophthalmic ultrasound A-scan/Bscan
- iv. Automated perimetry for glaucoma and neurological lesions
- v. Radiological tests - X rays - Antero posterior/ Lateral view PNS (Water's view)/optic canal views, Localisation of intra-ocular and intra-orbital FBs, Interpretations of -USG/ CT/ MRI Scans
- vi. OCT and UBM, ERG, EOG, and VEP

➤ **SURGICAL TECHNIQUES**

Phase wise training of post graduate student is imparted starting from basics to advance. Skill development forms a core of psychomotor domain of learning of students which is imparted with training in skill labs as well as supervised hand on procedures upon patients. The PG is provided with an opportunity to perform operations both extra-ocular and intra-ocular with the assistance of the senior post graduate students and/or under the direct supervision of a faculty member. The student is provided with an opportunity to learn special and complex operations by assisting the senior post graduate student or the faculty in operations of cases of the specialty and be responsible for the post-operative care of these cases.

In first phase, the post graduate student is given training in preparations of cases for operation, pre-medication and regional anaesthetic blocks. In the next phase, the post graduate student assists the operating surgeon during the operations. In the third phase, the post graduate student operates independently assisted by senior post graduate student or a faculty member. She/he is required to be proficient in some operations and show familiarity with others.

MINOR SURGICAL PROCEDURES – Must Know and Perform Independently

- i. Conjunctival and corneal foreign body removal on the slit lamp
- ii. Chalazion incision and curettage
- iii. Pterygium excision
- iv. Biopsy of small lid tumours
- v. Suture removal- skin/conjunctival/corneal/corneoscleral
- vi. Tarsorrhaphy
- vii. Subconjunctival injection
- viii. Retrobulbar, peribulbar anaesthesia
- ix. Posterior Sub-Tenon's injections
- x. Artificial eye fitting

SURGICAL PROCEDURES -Must Know and Can Perform Independently

- i. Ocular anaesthesia: Retrobulbar anaesthesia Peribulbar anaesthesia Facial blocks- O'Brein / Atkinson/Van lint and modifications Frontal blocks Infra orbital blocks Blocks for sac surgery
- ii. Lid Surgery-Tarsorrhaphy Ectropion and entropion Lid repair following trauma Epilation
- iii. Destructive procedures Evisceration with or without implant Enucleation with or without implant
- iv. Sac surgeries including dacryocystectomy, dacryocystorhinostomy, probing for congenital obstruction of nasolacrimal duct
- v. Strabismus surgery Recession and resection procedures on the horizontal recti.
- vi. Orbital surgery Incision and drainage via anterior orbitotomy for abscess Cyclocryotherapy/Cyclophotocoagulation

PG Students should be well conversant with use of operating microscope and must be able to perform the surgeries listed below competently under the same:

- i. Standard ECCE (extra capsular cataract extraction; first year) with or without IOL implantation
- ii. Small incision ECCE with or without IOL implantation and/or Phacoemulsification with PC IOL implantation
- iii. Intra capsular cataract extraction (second year)
- iv. Cataract with Phacoemulsification (third year)
- v. Secondary AC or PC IOL implantation

- vi. Vitrectomy/Scleral buckling
- vii. Intra-vitreous and intra-cameral (anterior chamber) injection techniques and doses of drugs for the same. Needs to know the basis of open sky vitrectomy (anterior segment) as well as management of cataract surgery complications. Assisting vitrectomy and scleral buckling procedures
- viii. Ocular surface procedures Pterygium excision with modifications Conjunctival cyst excision/foreign body removal
- ix. Corneal foreign body removal Conjunctival flap/ peritomy
- x. Glaucoma Trabeculectomy
- xi. Corneal Repair of cornea - scleral perforations Corneal suture removal Application of glue and bandage contact lens

Should have performed/assisted the following microscopic surgeries/laser procedures

- i. Keratoplasty Therapeutic and optical
- ii. Glaucoma surgery Trabeculectomy; Trabeculectomy/Goniotomy Glaucoma valve implant surgery Yag Capsulotomy
- iii. Laseriridotomy
- iv. Focal and panretinal photocoagulation

TEACHING-LEARNING METHODS

A. Theoretical methods:

1. Lectures, demonstrations: Didactic teaching in clinical, applied, and pre-clinical, paraclinical, and allied sciences (like forensic medicine, radiology, microbiology, pharmacology, pathology, biochemistry, biostatistics etc). These may be imparted by the members of the staff in respective disciplines or by clinicians themselves.

2. Group Discussion: The junior residents may present the seminar to the postgraduate student where it is fully discussed, before finally being discussed in front of the faculty or senior eye specialists. A free and fair discussion is encouraged. These discussions enable the postgraduate student to prepare for a general discussion in the class.

a. Seminars: seminars should be conducted at least once weekly. The duration should be at least one hour. The topics selected should be repeated once in 3 years so as to cover as wide a range of topics as possible. Seminars could be individual presentations or a continuum (large topic), with many students participating.

b. Journals Clubs: Journals will be reviewed covering all articles published on that topic over a 6 month period; these shall be presented by the student under the following headings. Aim 2) Methods 3) Observations 4) Discussions and 5) Conclusions. The student, to whom the journal club is allotted, presents the journal summaries to the senior postgraduates. They are expected to show their understanding of the aspects covered in the articles, clarify any of the points raised in the articles, offer criticisms, and evaluate the articles in the light of known literature.

c. Case Discussion:

- i. Bedside discussion on the rounds and outpatient teaching take their toll with patient management. Therefore, in addition to these, clinical case discussion should form part of a department's schedule at a fixed time every week. This could range from 1-2 hours and could be held at least once a week. The choice and manner of presentation and discussion varies widely and is left to the discretion of the department. Every effort should be made to include as wide a variety of cases as possible over three years with multiple repetitions. Problem oriented approach is better as it aids in decision making skills.
 - ii. Consultant case presentation is another approach which should be encouraged as it aids in solving complex problems and also acts as a forum for discussion of interesting cases.
 - iii. Case discussion on the patient-records written by the student is to be encouraged as it helps exercise the student's diagnostic and decision making skills. It also helps the consultant in critical evaluation of the student's progress academically.
 - iv. Case presentation at other in-hospital multidisciplinary forums should be encouraged.
- d. Self-Directed Learning using various offline and online resources of the university's and department. **(KgmU-elibrary)**

B. Practical training: The training would be given in wards, out-patients department, specialty clinics, allied departments and operation theatres.

i. Out Patients:

For the first six months of the training program, students may be attached to a faculty member to be able to pick up methods of history taking and ocular examination in ophthalmic practice. During this period the student may also be oriented to the common ophthalmic problems. The students are attached to a senior resident and faculty member whom they can consult in case of difficulty.

ii. Wards:

Each student may be allotted beds in the in-patient section depending upon the total bed capacity and the number of the postgraduate students. The whole concept is to provide the student with increasing opportunity to work with increasing responsibility according to seniority. A detailed history and case record is to be maintained by the student.

iii. Specialty clinics:

The student must rotate in the various subspecialty clinics run by the department. These include retina & uvea, glaucoma, cornea, strabismus, neuro-ophthalmology, oculoplasty, low vision and contact lens clinics.

iv. Interdepartmental Postings:

The students also undergo rotation in allied departments like Microbiology, pathology, radiology and Pediatrics.

ASSESSMENT

i. FORMATIVE ASSESSMENT (during the training)

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system. It is used to provide feedback to improve learning; it should also cover professionalism and communication skills.

ii. INTERNAL ASSESSMENT

The performance of the Postgraduate student during the training period should be monitored throughout the course and duly recorded in the log books as evidence of the ability and daily work of the student. Quarterly internal assessment is done based upon International Council of Ophthalmology prescribed curriculum.

iii. LOG BOOKS

Log books with unique identification numbers are issued to each student where details of their clinical and academic work is noted and marked. The students are also graded upon their professional conduct. A record is maintained to assess their level of clinical expertise and for suggesting remedial actions. These log books are unique and reflect the overall performance of student during the entire training period. The marking in these log books is done by departmental faculty who also provide their feedbacks in case they note deficiencies in students' performance.

iv. SUMMATIVE ASSESSMENT

The summative examination is carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000. The ratio of marks in theory and practical will be equal. The pass percentage will be 50%. Candidate will have to pass theory and practical examination separately.

Final university exam will consist of 4 theory papers of 100 marks each and a clinical/practical (viva-voce) examination of 600 marks.

Theory exam details are as given (general guidelines):

- i. Paper I (Basic Science related to Ophthalmology, Refraction & Optics)
- ii. Paper II (Clinical Ophthalmology)
- iii. Paper III (Systemic diseases in relation to Ophthalmology)
- iv. Paper IV (Recent advances in Ophthalmology and Community Ophthalmology)

Practical/viva-voce exam will consist of the following:

- i. 1 Long cases
- ii. 2 Short cases
- iii. 2 fundus cases
- iv. 1 refraction case

- v. Grand Viva/Log Book
- vi. Instruments
- vii. Pathology specimen
- viii. Drugs, X-rays, USG/OCT/CT/MRI scan
- ix. Visual field and other ophthalmic diagnostic charts

Suggested Reading Resources (Ophthalmology)

- i. E-library KGMU
- ii. Anatomy of the eye and orbit: Eugene Wolff
- iii. Clinico-Radiological Atlas of Orbital Disorders: Apjit Kaur
- iv. Clinical Ophthalmology Medical & Surgical Approach: Sandeep Saxena
- v. Strabismus for every Ophthalmologist: Siddharth Agrawal
- vi. Pediatric Cataract for every Ophthalmologist: Siddharth Agrawal
- vii. Clinical anatomy of the eye: Richard S Snell
- viii. Adler's Physiology of the Eye: Francis H Adler
- ix. Biochemistry of the eye: Elaine R. Berman
- x. Ocular Pathology: A Text and Atlas: Yanoff M & Fine BS
- xi. Ophthalmic Pathology: An Atlas and Textbook: Zimmerman LE
- xii. Ocular pharmacology: William H Havener
- xiii. Ocular Immunology: Gilbert Smolin
- xiv. Duke Elder's Practice of refraction: Sir Stewart Duke-Elder
- xv. Clinical optics: A. R. Elkington, Helena J. Frank, Michael J. Greaney
- xvi. Paediatric Ophthalmology and strabismus: Kenneth W Wright
- xvii. Binocular vision and ocular motility: Gunter K von Noorden
- xviii. Diagnosis and Management of Ocular Motility Disorders: Mein J, Trimble R.
- xix. Shields' textbook of glaucoma : Bruce M Shields
- xx. Becker-Shaffer's Diagnosis and Therapy of the Glaucomas
- xxi. Uveitis: a clinical approach to diagnosis and management : Ronald E Smith, Robert A Nozik
- xxii. Uveitis: fundamentals and clinical practice: Robert B. Nussenblatt and Alan G. Palestine
- xxiii. Vitreous Microsurgery: Steve Charles
- xxiv. Ultrasound of the eye and orbit: Sandra F Byrne and Ronald L. Green
- xxv. Clinical neuroophthalmology: Walsh & Hoyt
- xxvi. Diagnosis and management of intraocular tumors: Jerry A Shields
- xxvii. Diseases of the orbit: a multidisciplinary approach: Jack Rootman
- xxviii. Diseases of the orbit: Frederick A. Jakobiec and Ira S Jones
- xxix. Diagnosis and management of orbital tumors: Jerry A. Shields
- xxx. Grayson's diseases of the Cornea
- xxxi. Smolin and Thoft's The Cornea: scientific foundations and clinical practice
- xxxii. Stallard's Eye Surgery
- xxxiii. Ophthalmic Surgery: Principal and Practice. George L. Spaeth
- xxxiv. Cataract Surgery and its Complications. Normal S. Jaffe
- xxxv. Principal and Practice of Ophthalmology. G. A. Peymen
- xxxvi. Basic and Clinical Science Course. American Academy of Ophthalmology
- xxxvii. Principles and Practice of Ophthalmology by FA Jakobiec
- xxxviii. Retina by Stephen J. Ryan

JOURNALS

- i. Indian Journal of Ophthalmology

- ii. American Journal of Ophthalmology
- iii. Ophthalmology
- iv. Archives of Ophthalmology
- v. Survey of ophthalmology
- vi. International Ophthalmology Clinics
- vii. British Journal of Ophthalmology
- viii. Cornea
- ix. Retina
- x. Journal of Cataract and Refractive Surgery