

VISION FOR THE FUTURE - NIGERIA

The Ophthalmological Society of Nigeria

A Strategic Plan to Preserve and Restore Vision in Nigeria

Based on the blue print of the International Council for Ophthalmology's

VISION FOR THE FUTURE

VISION – ensuring its presence, dealing with its loss

OSN July 2005 version 1

ACKNOWLEDGEMENTS

At the International Federation of Ophthalmic Societies/International Council of Ophthalmology (IFOS/ICO) meeting in October 2004, the discussion centred on how important it was for ophthalmologists to provide leadership for eye care and eye care needs of members of the public. “The broad scope and depth of our training make ophthalmologists uniquely qualified to provide that leadership. But we must broaden our focus beyond the needs of our individual patients to wider communities and the public in general” said Professor Naumann, President of the International Council of Ophthalmology.

We cannot lead if we have no vision. Thus, prompted by Dr. Faal and with the tacit agreement of Professor Abiose, we decided it was time for sober reflection; time to study; to think carefully and formulate policies on how best we can answer this call to serve our communities and the general public better. For two days, at a resort in the Republic of Benin during the West African College of Surgeons annual meeting, Dr. Faal, Professor Abiose and I worked on the foundation for this project. This was followed by an OSN Retreat at Iseyin from March, 18-20, 2005. Out of the 28 members invited, 24 accepted without question. It showed the extent of the willingness of members to be a tool for a change for the better in Nigeria.

Our task was made a lot easier because the ICO had already taken up the gauntlet. It had produced the Strategic Plan - Vision For the Future. This is a unique document meant for ophthalmologists and everyone concerned with eye care all over the world. It is a masterpiece from great minds. I salute the vision, hard-work and intellectual capacity of everyone who took part in the development of this great document. It made our work somewhat less onerous. All we needed (and this was the intention of ICO) was to adapt it to our needs. We thank the ICO for giving us the permission to utilize any part of it without any fear of being accused of plagiarism. Thus we have named our own strategic plan, VISION FOR THE FUTURE - NIGERIA.

As of necessity, the writing of the strategic plan has some implications for the OSN Constitution. A committee of the OSN has had a look at these and has made proposals for constitutional changes. These will be submitted to the Annual General Meeting in September, 2005 for ratification and adoption.

We thank all the participants for their sacrifice in time and money to avail us of their talents. Special mention must be made of the tremendous assistance and encouragement received from Dr. Bruce Spivey. We would also like to acknowledge the suggestions and invaluable advice received from Dr. Bradley Straatsma, the brain behind the ICO’s document – Vision for the Future. Finally we are grateful to our publishers, in particular, Mr. Felix Adenaike whose enthusiasm to get it done properly was an additional catalyst that spurred us on.

B.G.K. Ajayi
President OSN, July1, 2005

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Vision for the Future: Nigeria

Preface

The Ophthalmological Society of Nigeria (OSN) has self-initiated a planning process noted herein as Vision for the Future: Nigeria. It is with great pleasure that the International Council of Ophthalmology has been able to support and encourage this effort which is one of the most forward steps taken by any national ophthalmologic society in the world.

The International Council of Ophthalmology (ICO), the executive body of the International Federation of Ophthalmological Society (IFOS), of which the OSN is a full member, completed a similar process in 1999. The effort has provided the IFOS/ICO blueprint for ICO new programs and actions; we anticipate a similar outcome of the efforts in Nigeria.

The ICO believes in the existing potential within the OSN and the training programs in Nigeria to the extent that we have committed substantial funds to provide broadband connections in six zones. There is also commitment by the ICO to work with the International Agency for the Prevention of Blindness to help create a world-recognized Ophthalmology Training Center including a high volume/high quality cataract program prototype in Nigeria.

It is the stimulus by individuals that results in positive actions by groups. The individuals and the organizations, the OSN, the ICO, as well as the WHO and IAPB, are committed to a successful implementation of Vision for the Future: Nigeria. This will result in a resurgence of the strong tradition of education, care, and research that has characterized Nigerian Ophthalmology in the past. When this happens, the people of Nigeria and West Africa will be well served in the fight to prevent and treat avoidable blindness.

Beyond the huge importance of the intent in this document, it sets an example for West Africa and all of Sub Saharan Africa. It can, and hopefully will be, an example for not only Africa but all developing countries.

Ophthalmologists have the training, and with it the responsibility, to lead the eye care team. It is our moral and professional responsibility to do so in a dedicated and effective manner.

Congratulations to the OSN and Nigerian Ophthalmology.

Bruce E. Spivey, MD
Secretary General & President-Elect
International Council of Ophthalmology

VISION FOR THE FUTURE-NIGERIA

The Ophthalmological Society of Nigeria's Strategic Plan to Preserve and Restore Vision in Nigeria *based on the blue print of the International Council for Ophthalmology Vision for the Future*

EXECUTIVE SUMMARY

1. Worldwide, in 2002, more than **161 million people were visually impaired**, of whom **124 million people had low vision** and **37 million were blind**. The figures for Nigeria are not known but from extrapolation about **1.2 million people are blind** and about **4.08million have low vision**. It is hoped that country data will emerge from the just commenced Nigerian survey. It is estimated that the number of blind and low vision will almost double by the year 2020 unless concerted action is taken.
2. Much of the visual loss is avoidable with current knowledge and technology. The Ophthalmological Society of Nigeria Strategic Plan to Preserve and Restore Vision – VISION FOR THE FUTURE-NIGERIA is designed to encourage, enhance and coordinate activities of ophthalmologists, other eye-care providers, physicians, health specialists and societal leaders in a sustained programme to decrease the toll of blindness and low vision throughout Nigeria.
3. In line with the Strategic Plan of the International Council of Ophthalmology, the central purpose of VISION FOR THE FUTURE-NIGERIA is to eliminate blindness and low vision that result from preventable and treatable eye disease for people throughout Nigeria. Participants will work to promote access to high-quality, affordable eye care and to promote access by ophthalmologists and others to the training and continuing education they need to provide appropriate eye care to people throughout Nigeria.
4. With a mission to preserve and restore vision, Vision For The Future-Nigeria, encourages activities to enhance Ophthalmological Education and Training, Ophthalmology Continuing Education, Eye Care Guidelines and Recommendations, Advocacy for the Preservation and Restoration of Vision, Research in Ophthalmology and Vision and the highest level of Ethical standards in the practice of Ophthalmology.
5. Ophthalmological Education and Training are needed to provide ophthalmology education to all medical students, to advance ophthalmology resident doctor training and to enhance the training of allied ophthalmic personnel.
6. Ophthalmology Continuing Education extends throughout the career of the ophthalmologist and encompasses development and dissemination of educational programmes so that all ophthalmologists can obtain and progressively increase personal knowledge and skills.

7. Eye Care Guidelines and Recommendations define appropriate eye care and encourage a standard of eye care quality of an internationally acceptable standard.
8. Advocacy for the Preservation and Restoration of Vision acts to increase public awareness of blindness prevention and to augment support and allocation of resources for Vision For The Future-Nigeria by ophthalmological associations, government and non-government organisations, industry, private sector, communities and the public at large.
9. Research in Ophthalmology and Vision encompasses basic science investigation, clinical and operational research focused on meeting the needs of eye care in Nigeria. Research is essential for the development of new and improved therapy as well as the identification of cost effective interventions for the control of the major causes of blindness and low vision.
10. Vision for the Future will enhance performance and productivity in the practice and training of ophthalmologists and other members of the eye care team by working with employers, industry and others to ensure the availability of functioning infrastructure, technology, work environment and participate in product development appropriate to the tasks which need to be performed for optimum patient care.
11. The Ophthalmological Society of Nigeria's Strategic Plan -Vision For The Future-Nigeria will work to increase the number and distribution of ophthalmologists in Nigeria. Medical doctors choosing to specialize in ophthalmology will be encouraged. More doctors are passing the primary examinations than the available training positions. Vision For The Future-Nigeria will work to ensure that there is a commensurate increase in the number of residency positions and training centres, increase sub-specialization, increase up-to-date equipment and facilitation of improvement in the training environment to encourage trainers and trainees.
12. Vision for the Future Nigeria will, in the training and practice of the profession, not only prevent visual disability, but will work with all other groups to achieve the dignity and social inclusion of the irreversibly visually disabled.
13. Active participation of all ophthalmologists will be pursued in order to achieve the goals of Vision 2020 – The Right to Sight. There will be increased membership drive for OSN and strengthening of zonal and state branches.
14. The Ophthalmological Society of Nigeria's Strategic Plan to Preserve and Restore Vision – Vision For The Future-Nigeria is a multi-year, flexible and interactive programme. Flexible in that a continuing process of review, modification and updating is planned. Interactive in that Vision For The Future-Nigeria envisions partnerships with Training Institutions and Certifying Bodies in Nigeria, Global Initiative For The Elimination of Avoidable Blindness/Vision 2020 and other African regional, national and institutional programmes sponsored by organizations and entities committed to the elimination of avoidable blindness and low vision.
15. Vision For The Future-Nigeria is directed and coordinated by the Ophthalmological Society of Nigeria (OSN) and the Ophthalmological Society of Nigeria Foundation (OSNF); the latter includes members from industry, private sector, communities and the public at large and mobilizes support for the implementation of the activities of OSN.

VISION FOR THE FUTURE - NIGERIA

OPHTHALMIC EDUCATION & TRAINING

OPHTHALMIC
RESEARCH

CONTINUING
EDUCATION

EYE CARE
ADVOCACY

EYE CARE
TEAM ROLES

EYE CARE
GUIDELINES

ETHICS

LINKAGES & PARTNERSHIPS

To Preserve and Restore Sight in Nigeria

MISSION

The central mission of The Ophthalmological Society Nigeria's Strategic Plan to Preserve and Restore Vision – Vision For The Future -Nigeria - is to eliminate blindness and low vision that result from preventable and treatable eye disease for people throughout Nigeria.

Nigerian Ophthalmology and the entities and individuals participating in Vision for the Future-Nigeria will work to help ensure that all people in Nigeria have access to high-quality and affordable eye care and to promote access by ophthalmologists and others to the training and continuing education they need to provide such eye care for the people of Nigeria.

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PRIMARY STRATEGIC DIRECTIONS

The Ophthalmological Society of Nigeria Strategic Plan to Preserve and Restore Vision – Vision For The Future-Nigeria, recognizes the importance of cooperation and coordination among individuals and organizations with similar goals of vision preservation and blindness prevention. To fulfil its mission, the Ophthalmological Society of Nigeria will:

- Encourage all ophthalmologists to devote their energy and resources to eliminating preventable vision loss and blindness throughout Nigeria.
- Stimulate an increased commitment to the preservation and restoration of vision and prevention of blindness among all state, zonal and national ophthalmological organizations, all sub-specialty organizations, government, non-governmental entities, private sector, industry and the communities.
- Strengthen links with and support other national, supranational societies and the International Federation of Ophthalmological Societies/International Council of Ophthalmology (IFOS/ICO).
- Support basic science, clinical and operational research in ophthalmology and vision. Of particular merit is research focused on meeting the need for increasingly effective eye care delivery with special emphasis on cost effective interventions for the control of the major causes of blindness and low vision.
- Work in partnership with training institutions and certifying bodies for the maintenance of high quality and relevant ophthalmic education to achieve the objectives of Vision for The Future-Nigeria.
- Collaborate with the World Health Organization (WHO) and play a leading role within the National Vision 2020 committee to maximise action by ophthalmologists and other eye care providers in support of the National Initiative for the Elimination of Avoidable Blindness and low vision- VISION 2020 – The Right to Sight in Nigeria.
- Demonstrate the quality of life and economic benefits of eye health of the individual and the contribution of programmes to preserve and restore vision to the achievement of national socioeconomic development to governmental officials and to other authorities in an effective effort to encourage allocation of the resources necessary for the elimination of avoidable blindness and low vision.
- Promote access to experiences derived from special circumstances throughout the world, scientific advances and environmental changes relevant to national preservation and restoration of vision.
- Develop links and partnerships with various groups with similar goals and objectives including disability groups
- Work to mobilize resources by the Ophthalmological Society of Nigeria Foundation (OSNF) to achieve the objectives.

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GOALS FOR NIGERIAN OPHTHALMOLOGY

To achieve the mission, goals of the Ophthalmological Society of Nigeria Strategic Plan to Preserve and Restore Vision – Vision for the Future-Nigeria encompass the following major areas of activity:

OPHTHALMIC EDUCATION AND TRAINING

Ophthalmologic education and training, including regular assessment of knowledge are needed to provide ophthalmology education to all medical students, to progressively advance ophthalmology resident doctor training programs and to enhance the training for allied ophthalmic personnel. These activities are central to enabling all people in Nigeria to have access to quality eye care.

OPHTHALMOLOGY CONTINUING EDUCATION

Ophthalmology continuing education, including regular assessment of knowledge, extends throughout the career of an ophthalmologist and encompasses the development and dissemination of educational programmes and materials so that all ophthalmologists can obtain and progressively enhance personal knowledge and skills needed to provide the best possible professional practice and eye care.

EYE CARE GUIDELINES AND RECOMMENDATIONS

Dissemination of eye care guidelines and recommendations that define appropriate eye care and encourage activities to achieve a universal, high standard of quality for ophthalmological professional services.

ADVOCACY FOR THE PRESERVATION AND RESTORATION OF VISION

Advocacy for the preservation and restoration of vision acts to increase public awareness of blindness preservation and to augment the allocation of resources necessary for the elimination of avoidable blindness. Advocacy encourages ophthalmological organizations, non-government entities and governments to aid the Global Initiative for the Elimination of Avoidable Blindness/Vision 2020 – The Right to sight - and other efforts to preserve and restore vision.

RESEARCH IN OPHTHALMOLOGY AND VISION

Research in ophthalmology and vision encompasses support for basic science and clinical research focused on meeting the global needs of the public and on developing new therapy for conditions that are now without effective treatment. Operational Research identifies modalities for efficient and effective use of resources and appropriate interventions

LINKAGES AND PARTNERSHIPS

Elimination of avoidable blindness and low vision, Vision 2020 – The Right to Sight will need partnerships with other stakeholders. Specifically for human resource development and capacity building, there will be the need for linkages and partnerships with training institutions, certifying colleges, other eye care providers and sister professional organisations. Vision for The Future-Nigeria will actively seek to make the necessary linkages and partnerships.

It is recognised that infrastructure and technology are absolutely essential factors in achieving the goals of vision for the Future-Nigeria. Linkages and partnerships will be made with employers, suppliers, the business sector and industry to ensure that the infrastructure and technology requirements for training and eye care are met and within the ethics of the profession.

Specifically for the irreversibly visually disabled, Vision for the Future-Nigeria will actively seek to have linkages with disability groups and service providers for the education, rehabilitation and social inclusion of the visually disabled.

ETHICS

The highest level of ethical standards is desirable in ophthalmology in relation to patients, colleagues, training, research and relationship with industry. Vision for The Future-Nigeria will disseminate guidelines and information aimed at ensuring the highest level of ethical standard with the practice of ophthalmology.

EYE CARE TEAMS

Achievement of the elimination of avoidable blindness and low vision will depend on the harmonious work of well trained, effective, efficient and equitably deployed eye care teams. Vision for The Future-Nigeria in conjunction with other eye care professionals will define role and responsibilities of eye care team members and ensure that ophthalmologists take on leadership responsibility for the eye care teams. It will advance team building, training and education of members of the eye care team.

OPHTHALMIC EDUCATION AND TRAINING

Ophthalmologic education and training, including regular assessment of knowledge are needed to provide ophthalmology education to all medical students, to progressively advance ophthalmology resident doctor training programmes and to enhance the training for allied ophthalmic personnel. These activities are central to enabling all people in Nigeria to have access to quality eye care.

Thus there are three facets to Ophthalmological education:

1. Ophthalmology teaching to Medical Students
2. Ophthalmology Resident and Specialist Training in Ophthalmology
3. Training for Allied Ophthalmic Personnel

MEDICAL SCHOOL CURRICULUM

With the believe that primary eye care, including recognition of eye diseases should be the responsibility of the general medical practitioners and family physicians, it is recommended that medical school curriculum should include the following:

- a) A basic understanding of the anatomy and functions of the eye and visual system
- b) Knowledge regarding the ophthalmic manifestations of systemic diseases such as hypertension, neurological diseases and diseases associated with other medical conditions. It is essential to emphasize that some systemic and some other diseases may present initially as eye problems and it will be important for these to be recognized and referred appropriately to the medical specialty concerned.
- c) Information regarding diagnosis and treatment of common ophthalmic diseases such as cataract, glaucoma, trachoma, acute inflammations, onchocerciasis, strabismus, age-related macula degeneration and nutritional amblyopia.
- d) Information regarding the diagnosis and treatment of the major causes of blindness and low vision in the various communities in Nigeria.

SKILLS

Medical Students must demonstrate competency in these skills:

1. **Measurement of Visual Acuity with and without pinhole.**

The medical student must be made to recognize the importance of the PINHOLE as an important tool for classification of visual impairment into two main groups.

- a) Improvement in Visual Acuity means the presence of a refractive error of any type. It does NOT exclude a pathology in the eye. Examination of the eye will reveal any pathology which is usually not related to the presenting visual impairment. This group of patients can suffer because problems such as glaucoma may be missed.
 - b) No Improvement in Visual Acuity means there is a definite pathology in the eye. Examination of the eye should reveal the pathology. Invariably this group of patients will need to be referred to the ophthalmologists. The significance of No Perception of Light in a patient especially with cataract must be emphasized.
2. **Assessment of extra-ocular motility and ocular position.** This will help to recognize the presence of squint and abnormal ocular position.
 3. **Penlight examination of the anterior segment including eversion of the upper eyelid** for signs of chronic conjunctivitis, trachoma, corneal or tarsal foreign body, corneal laceration etc. Fluorescein staining of the cornea to recognize corneal ulcer should be demonstrated.

4. **Measurement and interpretation of pupillary size and reactions.**
5. **Direct Ophthalmoscopy** with emphasis on the recognition of normal features. Special attention must be placed on the ability to recognise and describe the normal disc in a systematic manner. In the absence of time or difficulty with the demonstration of patients with the various fundal abnormalities, students must be made to look critically at abnormal fundal photos and describe these systematically in the light of the normal discs they have seen. Emphasis should be on descriptive features rather than attempting to make an ophthalmologic diagnosis of the fundus. With this approach, it should be relatively easy for students to pick up glaucomatous disc, papilloedema, optic atrophy etc.
6. **Confrontational Visual Field examination** and the recognition of hemianopic and bitemporal visual field loss.
7. **Removal of Corneal Foreign body.** Understanding of the symptomatology of corneal foreign body and corneal ulcer and the usefulness of fluorescein staining.

The curriculum should include an objective assessment of knowledge and skills and enable the medical school graduate to provide appropriate level of primary care and to recognize the indications and need for referral to the ophthalmologist.

EDUCATIONAL PRIORITIES AND HOURS IN CURRICULUM

The increasing population in the country coupled with the high prevalence of avoidable and curable blindness; increasing age of the population with consequent increase in age related diseases and the necessity to provide continued support for the expansion of ophthalmological education, make it imperative that Ophthalmology should continue to be an essential part of the Curriculum of Medical Schools.

Specific Teaching Methods

Three teaching methods have been described to achieve ophthalmic educational goals: traditional didactic lecture and clinical demonstration, illustrative case method study, and evidence-based medicine teaching in which ophthalmic education is paired with neuroscience, neurology, endocrinology and geriatric medicine. It is strongly recommended that medical schools employ all methods to achieve these broad educational goals.

Ophthalmic Education should take place in the classroom, clinic and operating theatre. Each student should be provided with the opportunity to watch simple ophthalmic procedures such as incision of chalazion, removal of corneal foreign bodies, cataract and glaucoma surgeries. Video recording of other surgical procedures should also be shown to stimulate interest of students and show the wide scope of the practice of ophthalmology.

It is not unusual during a particular posting of medical students, for certain important and relevant clinical cases such as trachoma, acute conjunctivitis, angle closure glaucoma, retinoblastoma etc. not to be available for demonstration to the students when required. As much as possible, photographic documentation of such cases should be kept and shown to students to compensate for the lack of availability of actual cases.

DURATION OF OPHTHALMOLOGICAL TRAINING

It is suggested that medical students spend a minimum of two full weeks during which clinic and theatre sessions are supplemented by formal lectures, audio-visuals and tutorials.

OPHTHALMOLOGY RESIDENT DOCTOR EDUCATION (FELLOWSHIP)

INTRODUCTION

An Ophthalmologist is a medical doctor, who has undergone additional specialized training, acquired skills in diagnosis and in medical and surgical management of disorders of the eye and the visual system and has obtained official documentation to be so designated by the Medical and Dental Council of Nigeria.

An ophthalmologist has a unique role in the society as the professional with a distinct body of knowledge, skills and attitudes dedicated to the maintenance and improvement of eye health.

PRINCIPLES AND GUIDELINES FOR OPHTHALMOLOGY SPECIALIST TRAINING

Ophthalmological care requires not only core competencies for an ophthalmic medical practitioner but also a set of specialized cognitive capabilities and an array of technical skills. Specialist training is designed to provide a structured program of learning that facilitates the acquisition of knowledge, understanding, skills and attitudes to a level appropriate for an ophthalmic specialist who has been fully prepared to begin his/her career as an independent consultant in ophthalmology.

GOALS OF THE TRAINING PROGRAM

The following outlines the essential intellectual and clinical information (cognitive and technical skills) that is necessary for a modern, comprehensive ophthalmologist. Core competencies and technical skills are described briefly. Skills in epidemiology and research methodologies are also important for the well-rounded ophthalmologist.

Training should be provided through a combination of lectures, supervised patient care, and graduated, hands-on procedural and surgical experience, research, and independent study. The focus should be not only on acquisition of knowledge and skills related to ophthalmology, but also on development of an appreciation for the importance of vision research, life-long learning, and the education of the public and other physicians.

The curriculum should be 4-5 years in length for the Fellowship programme and 18 months for the middle-level Diploma programme and should prepare the graduating ophthalmologist for an examination or testing process that leads to registration as a Fellow of the West African College of Surgeons (FWACS) or a Fellow of the National Postgraduate Medical College of Nigeria (FMCOPh.) or Diploma in Ophthalmology of the West African College of Surgeons (DOWACS).

Facilities should include: up-to-date ophthalmic equipment and instruments; examining rooms dedicated to ophthalmic education; links to hospitals or other facilities for anesthesia, radiology, clinical testing laboratories, other diagnostic services, and modern surgical suites with appropriate equipment. In addition, repositories of library materials or internet access to ophthalmic educational materials, such as journals, texts, tests, videotapes, and related resources, should be available, along with facilities for lectures and conferences (including audio-visual equipment).

A culture of learning and teaching should be established that includes not just modern facilities, but also a committed and dedicated cadre of skilled educators. Periodic audits and assessments of progress of individual trainees should include formal examinations (oral or written) requiring extensive knowledge in both basic and clinical sciences. Review of case logbooks (surgical and non-surgical) should regularly occur at each stage of the training process. The logbook for all surgical procedures should include indications for operation, intra-operative complications, and postoperative complications. The logbook is an important educational, clinical, and administrative tool.

In addition, it is considered desirable for supervised surgical training to begin as soon as possible after entry into the ophthalmic educational system. Graduated levels of responsibility should occur, commensurate with a trainee's education and set of skills. Various educational adjuncts should be available, including practice surgery on animal or outdated eye bank eyes, dissections of cadavers, videotapes, and web-based systems of instruction.

Videotaping surgery performed by trainees is extremely useful, both for the surgeon in training and for the mentor. Assisting senior surgeons on a regular basis is a time-honored and helpful educational activity for the trainee. In addition to acquiring intra-operative skills, the ophthalmologist in training must acquire abilities for pre-operative selection of suitable surgical candidates and in postoperative care.

Periodic audits of individual training programs are also desirable.

Core Competencies include the following:

Judging the competency of a physician is extremely difficult and it has been found to be almost impossible to define a competent physician. However, by assessing the 7 competencies as a measure of judging overall competence is most helpful. These competencies are obviously in addition to the knowledge, attitudes and skills that comprise a physician clinician. This is just as true for a specialist as it is for a general physician. These core competencies include the following:

- Patient Care
- Medical knowledge,
- Practice-based learning and improvement,
- Interpersonal and Communication Skills,
- Professionalism,
- Systems-based practice,
- Professional attitudes.

Patient Care

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:

- communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families;
- gather essential and accurate information about their patients;
- make informed decisions about diagnostic and therapeutic interventions, based on patient information and preferences, up-to-date scientific evidence, and clinical judgment;
- develop and carry out patient management plans;
- counsel and educate patients and their families;
- use information technology to support patient care decisions and patient education;
- perform competently the medical and invasive procedures considered essential for the area of practice;
- provide health care services aimed at preventing health problems or maintaining health;

- work with health care professionals, including those from other disciplines, to provide patient-focused care.

Medical Knowledge

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

- demonstrate an investigatory and analytic thinking approach to clinical situations;
- know and apply the basic and clinically supportive sciences which are appropriate to ophthalmology.

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:

- analyze practice experience and perform practice-based improvement activities using a systematic methodology;
- locate, appraise, and assimilate evidence from scientific studies related to their patients' health problems;
- obtain and use information about their own population of patients and the larger population from which their patients are drawn;
- apply knowledge of study designs and statistical methods to the appraisal of clinical studies and other information on diagnostic and therapeutic effectiveness;
- use information technology to manage information, access on-line medical information; and support their own education; and
- facilitate the learning of students and other health care professionals.

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:

- create and sustain a therapeutic and ethically sound relationship with patients;
- use effective listening skills and elicit and provide information using effective nonverbal, explanatory, questioning, and writing skills; and
- work effectively with others as a member or leader of a health care team or other professional group.

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:

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

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:

- 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;
- know how types of medical practice and delivery systems differ from one another, including methods of controlling health care costs and allocating resources;
- practice cost-effective health care and resource allocation that do not compromise quality of care;
- advocate for high quality patient care and assist patients in dealing with system complexities; and
- 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

Professional Attitudes

Professional attitudes and conduct require that trainees must also have developed a style of care which is:

- ❖ 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);
- ❖ reflective (including recognition of the limits of his/her knowledge, skills and understanding);
- ❖ ethical;
- ❖ integrative (including involvement in an inter-disciplinary team for the eye care of children, the handicapped, the systemically ill, and the elderly); and
- ❖ scientific (including critical appraisal of the scientific literature, evidence-based practice and use of information technology and statistics).

APPENDIX V

International Council of Ophthalmology (ICO) International Task Force on Resident and Specialists Training.

GUIDELINES FOR EDUCATION OF THE OPHTHALMIC SPECIALIST AND SUBSPECIALIST

Andrew G. Lee, MD, and Morton F. Goldberg, MD

OPHTHALMOLOGIST CONTINUING PROFESSIONAL EDUCATION

Ophthalmology continuing education extends throughout the career of an ophthalmologist. Education encompasses the development and dissemination of educational materials and programmes so that all ophthalmologists are able to acquire and enhance the knowledge and skills needed to provide the best possible eye care to all people.

There is no organised programme for effective continuing medical education for the Nigerian ophthalmologist. Therefore there are no sanctions for non-compliance. Previous decisions taken on this lacked follow-up and so nothing has come out of them. Even attendance at conferences, local and international, by ophthalmologists is very poor – only the same group are seen at every meeting. Some of the reasons suggested for this situation include:

- Apathy
- Wrong orientation during residency training
- Lack of awareness
- Finance

In order to be able to provide the possible eye care to all people, the OSN will

1. Encourage Continuing Education by all ophthalmologists especially in the areas of personal professional practice.
2. Identify available high quality continuing education materials and programmes for the use of ophthalmologists in Nigeria.
3. Take advantage of modern information technology to collect, distribute and disseminate important and relevant information necessary for the improvement of the ophthalmologist.
4. Stimulate ophthalmologists to evaluate professional knowledge and skills by periodic objective knowledge assessment programmes.
5. Promote innovative programmes of knowledge enrichment by special fellowship and twinning partnerships.
6. Establish appropriate mechanisms for ensuring minimal compliance by ophthalmologists with the continuing educational programmes.
7. Recommend appropriate sanctions to the relevant registration authority where these requirements are breached.

APPENDIX II

Recommendations of the Committee on Continuing Medical Education Programme

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EYE CARE TEAM ROLES AND RESPONSIBILITIES

Achievement of the elimination of avoidable blindness and low vision will depend on the harmonious work of well trained, effective, efficient and equitably deployed eye care teams. An eye care team is a group of people working together with a mission to preserve and restore vision, each recognising the importance of every member. They share a common goal: The Elimination of all causes of avoidable blindness so that all Nigerians will have the Right to Sight.

Categories of Eye Care Team Members:

Eye care workers can be grouped into three main categories;

1. Ophthalmologist - Fellows and Diplomates
2. Allied Ophthalmic Personnel
 - Optometrist
 - Ophthalmic Nurse
 - Optical Technician
 - Refractionist
 - Orthoptist
 - Equipment Technician
3. Integrated Eye Care Worker; these are health workers who during their routine work see eye cases
 - General Practitioner/Family Physicians
 - General Nurse and Midwife
 - CHEW/ CHO
 - Paramedic
 - Other Support Staff

Roles and responsibilities

Ophthalmologist

“An Ophthalmologist is a medical doctor, who has undergone additional specialized training, acquired skills in diagnosis and in medical and surgical management of disorders of the eye and the visual system and has obtained official documentation to be so designated by the Medical and Dental Council of Nigeria.

An ophthalmologist has a unique role in the society as the professional with a distinct body of knowledge, skills and attitudes dedicated to the maintenance and improvement of eye health.”

The Role and Responsibilities of the Ophthalmologist

- i. Team leader. Provides the leadership for eye care.
- ii. Provides proper planning, management and supervision of eye care services and programmes
- iii. Provision of comprehensive eye care services(Promotion, prevention, curative and rehabilitation)
- iv. Provision of Vision services
- v. Training of Allied Eye Care workers
 - i. Supervision of other Eye care workers
- vi. Research in Ophthalmology and Vision(Basic science investigation, Clinical and operational research)

Optometrist

An optometrist is a health personnel, (not medically qualified), trained in the detection, measurement and correction of refractive errors and able to detect low vision and the presence of an eye disease and refer such to an ophthalmologist for further investigations and treatment.

Role

- i. Provides screening and refraction services
- ii. Detection and referral of eye diseases such as cataract and glaucoma.
- iii. Provides primary eye care
- iv. Train eye care personnel in refraction and low vision care
- v. Research into vision correction and refraction service delivery.

Ophthalmic Nurse

An Ophthalmic Nurse is a health personnel trained in the nursing care of ophthalmic patients and in minor ophthalmic procedures

Role

- ii. Provision of Nursing care
- iii. Assisting in the theatre
- iv. Care of Ophthalmic instruments
- v. Training of Paramedics
- vi. Screening and detection of potentially blinding diseases and primary eye care
- vii. Supervision of other eye care workers
- viii. Research

Optical Technician

An Optical technician is a health personnel trained in the reading of prescription, fitting and dispensing of lenses.

Roles

- i. Reading of prescription
- ii. Fitting and dispensing of lenses
- iii. Care of Optical instruments

Refractionist

A refractionist is a health personnel trained in measurements and correction of simple refractive errors.

Role

- i. Refraction and correction of simple refractive errors
- ii. Detection and referral of compound refractive errors
- iii. Primary Eye Care

Orthoptist

An Orthoptist is a health personnel trained in the detection and measurement of extraocular muscle motility abnormalities.

Equipment technicians

An equipment technician is trained to maintain and repair ophthalmic instruments and equipments.

Ratio of Eye Care Team:

Defined by the HRD group for West Africa and OSN for Nigeria

For every One million population, the team is comprised of the following

Category	Number	OSN Recommendation
Ophthalmologist(Fellow)	2	4
Ophthalmologist(Diplomate)	4	6
Optometrist	2	4
Ophthalmic Nurse	8	12
Optical Technician	4	4
Refractionist	4	6
Orthoptist	2	4
Equipment Technician	1 per centre	2

Strategies for team building

1. Involvement of all full time eye care team members in the planning activities
2. Regular management meeting
3. Regular training and retraining of members
4. Adequate motivation
5. Ensuring proper information and communication among members
6. Respect and recognition of each member's role

Recommendations

1. Relevant contributions of other members of the eye care team should be obtained and incorporated into the Vision For the Future-Nigeria
2. Proper deployment of eye care team members to their relevant specialties must be ensured.

EYE CARE GUIDELINES AND RECOMMENDATIONS

In order to ensure an internationally acceptable standard of practice of ophthalmology in Nigeria, it is necessary to disseminate information that define appropriate eye care and encourage activities to achieve a universal, high standard of quality for ophthalmological professional services. Eye care guidelines and recommendations recognize the advances in ophthalmic science and technology that are responsible for a steadily higher standard of eye care expectations and results. Thus these must be regularly updated.

Objectives

Eye care guidelines and recommendations are presented to:

1. Aid ophthalmologists and ophthalmic care facilities to identify appropriate eye care.
2. Promote access to affordable, quality eye care for all people in Nigeria.
3. Promote appropriate standards of eye care delivery in Nigeria.
4. Encourage attainment of progressively higher standards of eye care quality.

Specific Action Plan

1. To provide information to the public as to places where they can obtain quality eye care through
 - a) Publishing of directory
 - b) Bill boards & Sign boards
 - c) Notices and advertisements in print and electronic media.
 - d) Television and radio health shows and talk.
2. Provision of eye care at primary, secondary and tertiary level should be in all Local Government areas of Nigeria. A model Ophthalmologic care unit should be designed by every zonal branch of the ophthalmological society of Nigeria with the active participation of their local government.
3. Encourage provision of incentives for eye care workers and services in the underserved areas.

EYE CAMPS

The backlog of cataract in Nigeria is very high and with the dismally low cataract surgical rate, it is not surprising that couching is still an important option for many to regain their sight even in the in some urban centers in Nigeria. Although an eye camp is not the best place to have cataract surgery, it is the only feasible way to help clear the cataract backlog and restore vision to a large number of our people. An Eye Camp here is defined as a fixed or existing facility, not a tent or a "camp". It may be the nearest hospital or rural health center modified for the purposes of eye surgery. The following, therefore, also represent the minimum standard of care that should be provided in any facility in Nigeria.

Various groups of eye care providers, locally and from overseas have conducted eye camps in various centers in Nigeria, some with disastrous consequences. It was obvious in many cases, that eye camps had been used by 'volunteers' as wet-laboratories to improve their surgical skills without as much as supervision by an experienced ophthalmologist. In a few other cases, foreign ophthalmologists had come into the country to use our people as guinea pigs to acquire competence in phaco-emulsification and some other procedures, whilst in some other cases, quacks and other eye care workers have capitalized on the chaotic situation to pose as ophthalmologists and perform surgery on innocent members of the public.

It is therefore pertinent that we establish specific guidelines and preferred practice pattern and minimum acceptable standards for cataract eye surgery.

GUIDELINES AND RECOMMENDED PRACTICE PATTERN FOR EYE CAMPS AND EYE SURGERY

A. Ophthalmologist and other members of the eye care team

1. Every eye camp team must have a local ophthalmologist as the team leader.
2. The ophthalmologist must have a valid and current licence to practice in Nigeria and must accept responsibility for the conduct of the camp and the professional standard of practice.
3. Any other ophthalmologist or ophthalmologist in training must also be duly licensed, to practice medicine in Nigeria, by the Medical and Dental Council of Nigeria (MDCN).
4. Any foreign doctor or ophthalmologist must have, in addition to a current licence in his/her home country, at the least, a temporary registration licence from MDCN and must accept to work under the local ophthalmologist, who is the team leader.
5. Nurses in the team must be registered with the Nursing Council of Nigeria.

B. Sponsorship

1. Whenever foreign nationals are brought into the country to provide ophthalmological services for Nigerians, sponsors should liaise with the a local Nigerian Eye Care team through the Ophthalmological Society of Nigeria.
2. Where this is not feasible for any reason, direct contact may be made with a local ophthalmologist.

The Roles and Responsibilities of The Team Leader

The team leader (ophthalmologist) must ensure:

- i.) That the visiting ophthalmologists and local members of the team) have the relevant qualification and experience necessary for the task they want to undertake.
- ii.) That members of the team are properly registered with the Medical and Dental Council of Nigeria or other appropriate registration bodies.
- iii.) That good collaboration exists between the visiting team and the local participants.
- iv.) That Nigerians (or any other person for that matter) are not used as guinea pigs for experimental and/or training purposes by the visiting team.
- v.) That good ethical practice is maintained at the camp.
- vi.) That relevant standards of instrument sterilization and infection control are maintained.
- vii.) That at least one medical officer who is capable of patient resuscitation (a specialist anaesthetist is not necessary) is available on the camp.
- viii.) That appropriate resuscitative equipment and materials are available on site.
- ix.) That there is capacity and willingness to transfer surgical patients to a city hospital should an intra-operative complication or immediate post-operative complication occur.
- x.) That prior arrangement is made with the receiving hospital for such emergencies.
- xi.) That follow-up arrangements and management of complications occurring after the departure of the visiting team are made.
- xii.) The doctor(s) for follow-up are designated and known to all before the commencement of surgical procedures.
- xiii.) Immediate post-operative materials and drugs are made available for all patients. Where patients have to pay, the cost estimate must be clearly stated and known to all before surgery is done.
- xiv.) That the best interest of the patients is the ultimate goal.

C. Screening

I. Physical Examination

There are three main goals for physical examination of a patient whose chief complaint might be related to a cataract:

1. To diagnose or confirm the presence of a cataract.
2. To confirm that the cataract is a significant factor related to the visual impairment and symptoms describe by the patient.
3. To exclude or identify other ocular or systemic conditions that might contribute to the patient's visual impairment.
4. To exclude or identify any condition that may affect the surgical plan or ultimate goal.

II. Ophthalmological Examination

Must document the status of both eyes. It should include the following components:

- i. patient history – including the patient's own assessment of functional status
- ii. past ocular history
- iii. Snellen's acuity and pinhole Visual acuity or refraction
- iv. measurement of intraocular pressure
- v. assessment of papillary function
- vi. examination of ocular motility
- vii. external examination
- viii. undilated and dilated slit-lamp examination
- ix. dilated examination of the fundus
- x. biometric examinations (keratometry and axial length measurements)

Since screening might have been done some days or even weeks before the eye camp, the ophthalmologist should be satisfied that there has been no significant change in the patient's ocular status or general health since the previous examination.

Preferred practice for Cataract Surgery

- i. The Gold Standard for cataract surgery is Phacoemulsification with foldable intraocular lens implantation.
- ii. The preferred procedure is Manual Small Incision cataract surgery with intraocular lens implantation.
- iii. The Minimal Acceptable Standard practice is Extra Capsular Cataract Extraction (ECCE)with intraocular lens implantation.
- iv. No patient should have ECCE only or Intra Capsular Cataract Extraction (ICCE), except there are extenuating circumstances or definite contraindications that make it impossible or unsafe for the minimally acceptable procedure.
- v. As much as possible Biometry should be performed to improve visual outcome.
- vi. Only one eye of a patient should be done at an eye camp.
- vii. A patient with an only eye must be given special attention and special precautions taken. As much as possible patients with cataract in an only eye should not be done in a camp setting.

Contra-Indications for Cataract Surgery

Surgery should not be performed if the patient

1. does not consent to surgery.
2. is a child
3. is medically unfit

4. unable to obtain adequate post-operative care.
5. needs special variant of surgery involving special equipment
6. surgery will not improve visual function
7. infected wound on face or body which may lead to post-operative endophthalmitis

Glaucoma Surgery

Diagnostic procedures must include applanation tonometry, fundoscopy and central visual field examination.

- i. Each patient must be thoroughly evaluated and assigned either to medical or surgical treatment.
- ii. Surgeons who undertake glaucoma surgery must constantly improve their skills and perform at least 50 Surgeries per year.
- iii. Glaucoma surgery must not ordinarily be undertaken in eye camp settings except where standard theatre facilities are provided.
- iv. Only one eye of a patient should be operated at one sitting.

Where a patient has an only eye, he should have the best of care.

III. INFORMED CONSENT in writing must be obtained even in eye camp setting.

It is the responsibility of the ophthalmologist who is to perform the surgery to personally verify all the above findings. There must be documentation of all relevant findings as well as operative procedure to facilitate post-operative follow-up.

IV. Management of the Pre-operative Patient

Scheduling

List patients by communities so as to allay their fears. It will also reduce the cost of transportation since a group of patients may travel together. There must be provision for accommodation for accompanying persons. Adequate and hygienic toilet facilities must be provided and suitable arrangements made for feeding. Water must never be in short supply in the camp.

Day of Surgery

On the day of surgery the patient should:

1. take light breakfast and use his routine medications for hypertension, diabetes or other prescribed medications as usual.
2. undergo baseline observations such as BP, pulse and respiratory rate
3. follow the facility's preparation protocol for entry to the operating theatre – donning clean disposable hat, shoes and gown over everyday wear
4. wash face thoroughly with soap and water
5. have the eye prepared for surgery
6. await surgery in a comfortable seating close to the operating theatre.
7. have dentures, hearing aids or limb prosthesis removed before entering theatre.

C. Eye Camps Locations

Locations with full surgical facilities are to be preferred. Patients should be brought to these centres after screening for their surgeries.

Where it becomes necessary to use an outreach temporary site, this must be evaluated to ensure that quality surgical care will not be compromised in any way.

VISION FOR THE FUTURE – NIGERIA - Code of Ethics

Preamble

The Code of Ethics of the Ophthalmological Society of Nigeria herein designated as OSN, applies to the Ophthalmological Society of Nigeria and to its Fellows and Members, and is enforceable by the Ophthalmological Society of Nigeria.

A. Principles Of Ethics

The Principles of Ethics form the first part of this Code of Ethics. They are aspirational and inspirational model standards of exemplary professional conduct for all Members of the OSN in any class of membership. They serve as goals for which OSN Members should constantly strive. The Principles of Ethics are not enforceable.

1. Ethics in Ophthalmology.

Ethics address conduct and relate to what behaviour is appropriate or inappropriate, as reasonably determined by the entity setting the ethical standards. An issue of ethics in ophthalmology is resolved by the determination that the best interests of patients are served.

2. Providing Ophthalmological Services.

Ophthalmological services must be provided with compassion, respect for human dignity, honesty and integrity.

3. Competence of the Ophthalmologist.

An ophthalmologist must maintain competence. Competence can never be totally comprehensive, and therefore must be supplemented by other colleagues when indicated. Competence involves technical ability, cognitive knowledge, and ethical concerns for the patient. Competence includes having adequate and proper knowledge to make a professionally appropriate and acceptable decision regarding the patient's management.

4. Communication with the Patient.

Open communication with the patient is essential. Patient confidences must be safeguarded within the constraints of the law.

5. Fees for Ophthalmological Services.

Fees for ophthalmological services must not exploit patients or others who pay for the services.

6. Corrective Action.

If a member has a reasonable basis for believing that another person has deviated from professionally accepted standards in a manner that adversely affects patient care or from the Rules of Ethics, the member should attempt to prevent the continuation of this conduct. This is best done by communicating directly with the other person. When that action is ineffective or is not feasible, the member has a responsibility to refer the matter to the appropriate authorities and to cooperate with those authorities in their professional and legal efforts to prevent the continuation of the conduct.

7. An Ophthalmologist's Responsibility.

It is the responsibility of an ophthalmologist to act in the best interest of the patient.

B. Rules of Ethics

The Rules of Ethics form the second part of this Code of Ethics. They are mandatory and descriptive standards of minimally acceptable professional conduct for all Members of the OSN in any class of membership. The Rules of Ethics are enforceable.

Foreign Ophthalmologist

Every Foreigner practising ophthalmology in Nigeria, irrespective of the duration of practice, shall be expected to keep to this code of ethics.

1. Competence. An ophthalmologist is a medical practitioner (physician) registered by the Medical and Dental Council of Nigeria, who has received additional education and training to provide medical and surgical care of the eyes and related structures. An ophthalmologist should perform only those procedures in which the ophthalmologist is competent by virtue of specific training or experience or is assisted by one who is. An ophthalmologist must not misrepresent credentials, training, experience, ability or results.

2. Informed Consent. The performance of medical or surgical procedures shall be preceded by appropriate informed consent.

3. Clinical Trials and Investigative Procedures. Use of clinical trials or investigative procedures shall be approved by adequate review mechanisms. Clinical trials and investigative procedures are those conducted to develop adequate information on which to base prognostic or therapeutic decisions or to determine aetiology or pathogenesis, in circumstances in which insufficient information exists. Appropriate informed consent for these procedures must recognize their special nature and ramifications.

4. Other Opinions. The patient's request for additional opinion(s) shall be respected. Consultation(s) shall be obtained if required by the condition.

5. The Impaired Ophthalmologist. A physically, mentally or emotionally impaired ophthalmologist should withdraw from those aspects of practice affected by the impairment. If an impaired ophthalmologist does not cease inappropriate behaviour, it is the duty of other ophthalmologists who know of the impairment to take action to attempt to assure correction of the situation. This may involve a wide range of remedial actions.

6. Pre-treatment Assessment. Treatment shall be recommended only after a careful consideration of the patient's physical, social, emotional and occupational needs. The ophthalmologist must evaluate the patient and assure that the evaluation accurately documents the ophthalmic findings and the indications for treatment. Recommendation of unnecessary treatment or withholding of necessary treatment is unethical.

7. Delegation of Services. Delegation is the use of auxiliary health care personnel to provide eye care services for which the ophthalmologist is responsible. An ophthalmologist must not delegate to an auxiliary those aspects of eye care within the unique competence of the ophthalmologist (which do not include those permitted by law to be performed by auxiliaries). When other aspects of eye care for which the ophthalmologist is responsible are delegated to an auxiliary, the auxiliary must be qualified and adequately supervised. An ophthalmologist may make different arrangements for the delegation of eye care in special circumstances, so long as the patient's welfare and rights are the primary considerations.

8. Postoperative Care. The providing of postoperative eye care until the patient has recovered is integral to patient management. The operating ophthalmologist should provide those aspects of postoperative eye care within the unique competence of the ophthalmologist (which do not include those permitted by law to be performed by auxiliaries). Otherwise, the operating ophthalmologist must make arrangements before surgery for referral of the patient to another ophthalmologist, with the patient's approval and that of the other ophthalmologist.

The operating ophthalmologist may make different arrangements for the provision of those aspects of postoperative eye care within the unique competence of the ophthalmologist in special circumstances, such as emergencies or when no ophthalmologist is available, so long as the patient's welfare and rights are the primary considerations. Fees should reflect postoperative eye care arrangements with advance disclosure to the patient.

9. Medical and Surgical Procedures. An ophthalmologist must not misrepresent the service that is performed or the charges made for that service.

10. Procedures and Materials. Ophthalmologists should order only those laboratory procedures, optical devices or pharmacological agents that are in the best interest of the patient. Ordering unnecessary procedures or materials or withholding necessary procedures or materials is unethical.

11. Commercial Relationships. An ophthalmologist's clinical judgment and practice must not be affected by economic interest in, commitment to, or benefit from professionally related commercial enterprises.

12. Communications to Colleagues. Communications to colleagues regarding any patient or matter must be accurate and truthful.

13. Communications to the Public. Communications to the public must be accurate. They must not convey false, untrue, deceptive, or misleading information through statements, testimonials, photographs, graphics or other means. They must not omit material information without which the communications would be deceptive.

Communications must not appeal to an individual's anxiety in an excessive or unfair way; and they must not create unjustified expectations of results. If communications refer to benefits or other attributes of ophthalmic procedures that involve significant risks, realistic assessments of their safety and efficacy must also be included, as well as the availability of alternatives and, where necessary to avoid deception, descriptions and/or assessments of the benefits or other attributes of those alternatives.

Communications must not misrepresent an ophthalmologist's credentials, training, experience or ability, and must not contain material claims of superiority that cannot be substantiated. If a communication results from payment by an ophthalmologist, this must be disclosed unless the nature, format or medium makes it apparent.

14. Interrelations Between Ophthalmologists. Interrelations between ophthalmologists must be conducted in a manner that advances the best interests of the patient, including the sharing of relevant information.

15. Conflict of Interest. A conflict of interest exists when professional judgment concerning the well being of the patient has a reasonable chance of being influenced by other interests of the provider. Disclosure of a conflict of interest is required in communications to patients, the public, and colleagues.

16. Expert Testimony. Expert testimony should be provided in an objective manner using medical knowledge to form expert medical opinions. Non-medical factors (such as solicitation of business from attorneys, competition with other physicians, and personal bias unrelated to professional expertise) should not bias testimony. It is unethical for a physician to accept

remuneration that is contingent upon the outcome of litigation. False, deceptive or misleading expert testimony is unethical.

C. Administrative Procedures

The Administrative Procedures form the third part of this Code of Ethics. They provide for the structure and operation of the Ethics Committee; they detail procedures followed by the Committee and by the Board of Trustees of the OSN in handling inquiries or challenges raised under the Rules of Ethics. All ophthalmologists who are Fellows or Members of the OSN in any class of membership are required to comply with these Administrative Procedures; failure to cooperate with the Ethics Committee or the Board of Trustees in a proceeding on a challenge may be considered by the Committee and by the Board of Trustees according to the same procedures and with the same sanctions as failure to observe the Rules of Ethics.

Register

The OSN shall maintain a yearly listing of ethically compliant Members of the OSN

Ethics Committee.

An Ethics Committee shall be set up by the OSN

The Committee.

The Board of Trustees appoints at least five (5), but not more than nine (9), ophthalmologists who are Voting Fellows or Members of the OSN to serve three (3) year, staggered terms as members of the Ethics Committee. The Board of Trustees makes its appointments from among respected ophthalmologists who will, to the extent practicable, assure that the Committee's composition is balanced as to relative age, diversity and experience, and as to the emphasis of the appointees upon practice, education, research or other endeavours within ophthalmology.

The Board of Trustees may terminate membership on the Ethics Committee at any time and for any reason. The Board of Trustees fills vacancies on the Committee. Committee members are reimbursed for expenses. The Ethics Committee is responsible for (i) developing and implementing an educational program regarding professional ethics and the Code of Ethics of the Ophthalmological Society of Nigeria and College Faculties, especially among ophthalmologists and ophthalmologists-in-training who are Members of the OSN; (ii) responding to each inquiry regarding ethics and, if appropriate, making a recommendation to the Board of Trustees regarding action, such as the development of an advisory opinion interpreting the Rules of Ethics in this Code; (iii) investigating each challenge regarding ethics and recommending whether the Board of Trustees should make a determination that a Member of the OSN has failed to observe the Rules of Ethics in this Code, and recommending an appropriate sanction; (iv) serving as a resource for the OSN, its members and its Board of Trustees regarding professional ethics and ethical issues; (v) assessing the Principles of Ethics, Rules of Ethics and Administrative Procedures in this Code periodically and recommending any amendments to the Board of Trustees and (vi) collating data on Ethics from International bodies.

(b) The Ethics Committee or any authorised organ of the OSN shall have the right to audit any eye care practice in the country for the purpose of good patient care.

(c) The Chair of the Committee. Upon nomination by the President, the Board of Trustees appoints one (1) member of the Ethics Committee as the Committee's Chairman to serve, at the will of the Board of Trustees, as the principal administrative officer responsible for management of the promulgation, interpretation and enforcement of this Code of Ethics. The Board of Trustees appoints as the Chairman, a distinguished ophthalmologist who possesses recognized integrity and broad experience. The Chairman of the Committee is responsible

directly and exclusively to the Board of Trustees; the Chairman is reimbursed for expenses and, upon the approval of the Board of Trustees, may be paid for services; and the Chairman is provided, upon the approval of the Board of Trustees, with staff, legal counsel and other resources necessary to fulfil the responsibilities of administering this Code. The Chairman presides at, and participates in, all meetings and hearings of the Ethics Committee, except that the Chairman need not participate at hearings at which the Committee considers the possible failure of a Fellow or Member of the OSN to observe the Rules of Ethics in this Code. The Chairman is responsible for ensuring that these Administrative Procedures are followed. The Chairman maintains liaison with entities, both public and private, which are interested or involved in medical ethics, particularly as they relate to ophthalmology.

(d) The Vice Chair of the Committee. Upon nomination by the President of the OSN, the Board of Trustees appoints one (1) member of the Committee as the Committee's Vice Chairman to serve, at the will of the Board of Trustees, in the place of the Chairman when the Chairman is unable to serve.

(e) Meetings of the Committee Meetings of the Ethics Committee are called upon at least seven (7) days' written notice to Committee members, which notice includes a copy of the agenda for the meeting. A quorum consists of a majority of all the appointed Committee members. Voting is by majority of those present at a meeting (or by a majority of those submitting votes in a mail vote). Mail voting without a meeting is permitted where all Committee members submit mail votes or abstentions. Voting by proxy is not permitted. A member of the Committee must decline to participate in the consideration of, or the decision in, any matter before the Committee in which the member has a personal interest.

(f) Indemnification and Insurance. All Ethics Committee members, staff, and other individuals engaged in investigations at the written request of the Chairman, are indemnified and defended by the Academy against liability arising from Committee-related activities to the extent provided by the Bylaws of the OSN for Trustees, Officers, committee members, employees and agents. The OSN maintains indemnification insurance against such liability.

2. Inquiries and Challenges.

(a) Preliminary Review. The Committee preliminarily reviews each submission involving this Code of Ethics to consider whether it may be an inquiry (e.g., a request for issuance by the Executive Committee of an advisory opinion interpreting the Rules of Ethics in this Code) or a challenge (i.e., a request for a finding by the Board of Trustees that a Member of the OSN has failed to observe the Rules of Ethics in this Code). A submission involving this Code of Ethics, whether or not it is designated or phrased as an inquiry or challenge, may be construed by the Chairman or the Committee as either an inquiry or a challenge in the light of information in the submission. Inquiries may be considered without regard to their means or form of submission. Challenges relating to information not in the public domain are not considered unless they are submitted in writing and signed by their submitters. Inquiries or challenges may be submitted by ophthalmologists (whether or not they are Members of the OSN), other physicians, health care institutions, health care reimbursers, allied health professionals, patients or organizations representing any of these.

(b) Preliminary Disposition. Upon preliminary review of a submission involving this Code of Ethics, the committee may conclude, that the submission (i) contains insufficient information on which to base an investigation or (ii) is patently frivolous or inconsequential. For example, the Committee may conclude that a submission does not present an issue of interpretation of the Rules of Ethics in this Code adequate to constitute a valid and actionable inquiry and further investigation to justify bringing the submission and recommendation to the Board of Trustees on issuance of an advisory opinion. Similarly, the Committee may conclude that a submission does not present an issue of the failure of a Fellow or Member of the OSN to observe the Rules of Ethics in this Code adequate to constitute a valid and actionable challenge and to justify bringing the submission before the Committee for investigation and recommendation to the Board of Trustees on a determination of failure to observe the Rules of Ethics. If the Chairman so concludes, the submission is disposed of by notice from the

Chairman to its submitter, if the submitter is identified. Each such preliminary disposition by the Committee of a submission involving this Code of Ethics shall be reported to the OSN Board of Trustees and the Submitter duly informed.

(c) Investigation. For each submission involving this Code of Ethics that the Committee concludes is a valid and actionable inquiry or challenge, the Committee conducts an investigation into its specific facts or circumstances to whatever extent is necessary in order to clarify, expand or corroborate the information provided by the submitter. The Chair may supervise each investigation and may conduct an investigation personally. The Chair may be assisted in the conducting of an investigation by other Ethics Committee members or by Committee staff. The Chair may also be assisted by any other individual, such as a member of the Council of the OSN (i) whose location, professional position or expertise might facilitate the investigation, (ii) whose assistance is requested in writing by the Committee Chair, and (iii) who agrees in writing to follow the Administrative Procedures of this Code, but only when all three (3) of those conditions are fulfilled. A member of the OSN who is the subject of a valid and actionable challenge is informed in writing at the beginning of the Committee's investigation as to (i) the nature of the challenge, (ii) the obligation to cooperate fully in the Committee's investigation of the challenge, and (iii) the opportunity to request a hearing on the challenge before the Ethics Committee. Investigations involving challenges are conducted in confidence, with all written communications sealed and marked "Personal and Confidential," and they are conducted objectively, without any indication of prejudice. An investigation may be directed toward any aspect of an inquiry or challenge, which is relevant or potentially relevant. The investigation may include one (1) or more site visits and informal interviews with the Member who is the subject of the challenge.

3. Proceedings on Inquiries.

(a) Hearing on an Inquiry. In the course of an investigation involving an inquiry, the Committee may conduct a public administrative hearing to receive the views of those who are interested in, or may be affected by, issuance by the OSN Board of Trustees of an advisory opinion interpreting the Rules of Ethics in this Code. Thirty (30) days' written notice of the hearing is given to the Fellows and Members of the OSN and to others who, in the opinion of the Committee, may be interested in, or affected by, issuance of an advisory opinion. The notice may include a tentative proposed advisory opinion. The hearing is conducted by the Committee with any three (3) or more Committee members participating. The Chair of the Committee serves as the Hearing Officer to preside at the hearing and assure that these Administrative Procedures are followed. The Hearing Officer may issue an appropriate procedural or evidentiary ruling in the course of the hearing and may be assisted by legal counsel. The Hearing Officer presents at the hearing the issues raised by the inquiry, the results of the investigation up to the time of the hearing, and any tentative proposed Committee recommendation to the OSN Board of Trustees for an advisory opinion. Information is offered through witnesses who may be assisted by legal counsel and are subject to questioning by the Committee. Any information may be considered which is relevant or potentially relevant. A transcript or audio recording of the hearing is made. The official record of the hearing becomes part of the investigation of the inquiry.

(b) Recommendation on an Inquiry. Upon completion of an investigation involving an inquiry, the Ethics Committee may develop an advisory opinion, which is submitted to the Board of Trustees for approval.

(c) Advisory Opinion. The Board of Trustees issues an advisory opinion interpreting the Rules of Ethics in this Code (i) upon the recommendation of the Ethics Committee arising from an inquiry and following an investigation or (ii) upon the recommendation of the Committee arising from its own initiative. A representative of the Committee presents to the Board of Trustees, for its review, the recommendations of the Committee and its record of the investigation. Once issued by the Board of Trustees, the advisory opinion is promulgated by publication to the and Members of the OSN. Advisory opinions are compiled by the Ethics Committee; and the compilation is periodically made available to the Members of the OSN.

4. Proceedings on Challenges.

(a) Hearing on a Challenge. In the course of an investigation involving a challenge, the Committee conducts a private adjudicative hearing if one is requested by the Member of the OSN who is the subject of the challenge or at the Committee's own initiative. Member who is the subject of the challenge shall be given at least thirty (30) days notice of his right to request a hearing. If a hearing is requested, thirty (30) days written notice of the date, time and location of the hearing is given to the Member. The hearing is conducted by the Committee with any three (3) or more Committee members participating, other than the investigator and any other Committee member who assisted substantially in the investigation of the challenge, and any Committee member whose professional activities are conducted at a location in the approximate area of that of the Member of the OSN who is the subject of the challenge. The Chairman of the Ethics Committee may be one (1) of the three (3) or more Committee members conducting the hearing unless the individual is disqualified by reason of circumstances described in the preceding sentence. Those Committee members participating in the hearing elect from their number a Hearing Officer to preside at the hearing and assure that these Administrative Procedures are followed. The Hearing Officer may issue any appropriate procedural or evidentiary rulings in the course of the hearing and may be assisted by legal counsel. The Hearing Officer, or a person or persons designated by the Hearing Officer, shall summarize for the Ethics Committee the results of the investigation up to the date of the hearing which are believed to support a finding that the Member has failed to observe the Rules of Ethics, and may make such other introductory factual remarks as the Hearing Officer or the Hearing Officer's designate deems appropriate. A person designated by the Ethics Committee shall present the facts indicating that the Member has failed to observe the Rules of Ethics, including documentary evidence and the testimony of witnesses. Those witnesses shall be available in person or by telephone for questioning by the members of the Ethics Committee and its legal counsel and by the Member or the Member's legal counsel or other representative. The Member subject to the challenge may be assisted at the hearing, at their sole cost and expense, by legal counsel or other representative selected by the Member. The Member or legal counsel or other representative may present documentary evidence and the testimony of witnesses in the Member's defence. Those witnesses shall be available in person or by telephone for questioning by the Member or legal counsel or other representative and by the members of the Ethics Committee and its legal counsel. Any information may be considered which is relevant or potentially relevant. The Member may submit a written statement at the close of the hearing. A transcript or audio recording of the hearing is made. The hearing is closed to all except the Committee, the Chairman, the Member of the OSN who is the subject of the challenge, their respective witnesses (when testifying and at other times as determined by the Hearing Officer) and counsel or, in the case of the Member, other representative, staff and official reporter. The official record of the hearing becomes a part of the record of the investigation of the challenge.

(b) Recommendation on a Challenge. Upon completion of an investigation involving a challenge, the Ethics Committee recommends whether the Board of Trustees should make a determination that the Member of the OSN who is the subject of the challenge has failed to observe the Rules of Ethics in this Code. When the Committee recommends a determination by the Board of Trustees of non-observance, the Committee also recommends imposition by the NEC of an appropriate sanction. A copy of the recommendation and a statement of the basis for the recommendation shall be provided to the Member. If the Committee so recommends, a proposed determination with a proposed sanction is prepared and is presented by a representative of the Committee to the Board of Trustees along with the record of the Committee's investigation. If the Committee recommends against a determination of non-observance, the challenge is dismissed, with notice to the Member of the OSN who is the subject of the challenge and to the submitter of the challenge, and a summary report is made to the Board of Trustees. In the sole discretion of the Committee and with the written consent of the Member who was the subject of the challenge, the Committee may recommend to the Board of Trustees that the fact of the dismissal of the challenge (and, in appropriate cases, the reasons for the dismissal) be publicized, and the Board of Trustees may, in its sole discretion, determine the nature, extent and manner of such publicity.

(c) Determination of Non-Observance. The Board of Trustees makes the determination whether a Member of the OSN has failed to observe the Rules of Ethics in this Code and imposes an appropriate sanction upon the recommendation of the Ethics Committee arising from a challenge and following an investigation. The Board of Trustees reviews the recommendation of the Committee based upon the record of the investigation. The Board of Trustees may accept, reject or modify the Committee's recommendation, either with respect to the determination of non-observance or with respect to the sanction. If the Board of Trustees makes a determination of non-observance, this determination and the imposition of a sanction are promulgated by written notice to the affected Member of the OSN and to the submitter of the challenge, if the submitter agrees in advance and in writing to maintain in confidence whatever portion of the information is not made public by the Board of Trustees. Additional publication occurs only to the extent provided in the sanctions themselves. If the Board of Trustees does not make a determination of non-observance, the challenge is dismissed, with notice to the affected Member and to the submitter of the challenge.

(d) Alternative Disposition. Before the Committee makes any recommendation to the Board of Trustees as to a determination that a Member of the OSN has failed to observe the Rules of Ethics in this Code, the Committee may extend to the Member an opportunity to submit a proposed alternative disposition of the matter in whole or in part upon terms and conditions suggested by the Ethics Committee. The terms and conditions may include sanctions and restrictions which are the same as, different from, or more or less restrictive than the sanctions contained in the following lettered paragraph, but shall in all cases include a written assurance by the Member that the possible non-observance has been terminated and will not recur. The decision of the Ethics Committee on whether to extend such an opportunity is entirely within the Committee's own discretion, based upon its investigation of the challenge and upon its assessment of the nature and severity of the possible non-observance when viewed from the point of view of what is in the best interests of patients of the Member of the OSN who is the subject of the challenge. If an opportunity to submit a proposed alternative disposition is extended by the Ethics Committee, an alternative disposition will be considered only if the Member of the OSN submits to the Ethics Committee the proposed alternative disposition within thirty (30) days of the date of the Ethics Committee's notice to the Member that it is extending such an opportunity. If the Member timely submits a proposed alternative disposition that is accepted by the Board of Trustees and Ethics Committee, the matter shall be resolved on the basis of the alternative disposition, and notice shall be given to the submitter of the challenge, only if the submitter agrees in advance and in writing to maintain the information in confidence.

(e) Sanctions. Any of the following sanctions may be imposed by the Board of Trustees upon a Member of the OSN who, the Board of Trustees has determined, has failed to observe the Rules of Ethics in this Code, although the sanction applied must reasonably relate to the nature and severity of the non-observance, focusing upon reformation of the conduct of the Member and deterrence of similar conduct by others:

- (i) Reprimand to the Member of the Society, with publication of the determination and with or without publication (at the discretion of the Board of Trustees of the Member's name;
- (ii) Suspension of the Member from the OSN for a designated period, with publication of the determination and with or without publication (at the discretion of the Board of Trustees) of the Member's name; or
- (iii) Termination of the OSN membership of the Member, with publication of the determination and of the Member's name.

In addition to and not in limitation of the foregoing, in any case in which the Board of Trustees determines that a Member has failed to observe the Rules of Ethics, the Board of Trustees may impose the further sanction that the Member shall not be entitled to sponsor, present, or participate in a lecture, poster, film, instruction course, panel, or exhibit booth at any meeting or program of or sponsored by the OSN (A) for a period of up to five (5) calendar years from and after the effective date a sanction described in clause (i) or (ii) of this paragraph 4(e) is imposed for the first time upon the Member, or (B) at any time from and

after the effective date a sanction described in clause (i) or (ii) of this paragraph 4(e) is imposed for a second time upon the Member, or (C) at any time from and after the effective date a sanction described in clause (iii) of this paragraph 4(e) is imposed upon the Member.

Members of the OSN who are suspended are deprived of all benefits and incidents of membership during the period of suspension, except continued participation in OSN insurance programs. If the Member is suspended with publication of the Member's name or terminated, and the appeal (if any) sustains the determination on which the sanction is based, the Board of Trustees may authorize the Ethics Committee to communicate the determination and transfer a summary or the entire record of the proceeding on the challenge to an entity engaged in the administration of law or a governmental program or the regulation of the conduct of physicians, in a proceeding that relates to the subject matter of the challenge, provided, however, that the entity is a federal or state administrative department or agency, law enforcement agency, physician licensing authority, medical quality review board, professional peer review committee, or similar entity; and the Chair of the Ethics Committee may appear if requested as a witness to that determination and record. Except in the instance of communication of the determination and transferral of the record, or in the instance of request of the record by the Member of the OSN who was the subject of the challenge, the entire record, including the record of any appeal, is sealed by the Ethics Committee and the Board of Trustees and no part of it is communicated by the members of the Board of Trustees, the members of any appellate body, the members of the Ethics Committee, the staff or any others who assisted in the proceeding on the challenge, to any third parties. Members of the OSN whose membership has been terminated as provided in this paragraph 4(e) may not reapply for membership in any class.

(f) Appeal. Within thirty (30) days of receipt of notice of a determination by the Board of Trustees that a Member of the OSN has failed to observe the Rules of Ethics in this Code and of imposition of a sanction, the affected Member may submit to the Board of Trustees in writing a request for an appeal. The OSN establishes an appellate body consisting of at least three (3), but not more than five (5), ophthalmologists who are Voting Members of the OSN and who did not participate in the Ethics Committee's investigation or in the Board of Trustees determination. The appellate body conducts and completes the appeal within ninety (90) days after receipt of the request for an appeal. The purpose of the appeal is to provide an objective review of the original challenge, the investigation and recommendation of the Ethics Committee, and the determination of the Ethics Committee, and the determination of the Board of Trustees, but not, however, the sanction imposed. The appeal is limited to a review of the Ethics Committee and the Board of Trustees' application of the Rules of Ethics in this Code to the facts established in the investigation of the challenge and to a review of the procedures followed to ascertain whether they were consistent with those detailed in these Administrative Procedures. An appeal may not take into consideration any matters not included as part of the record of the Ethics Committee's investigation and the Board of Trustees determination. The appeal consists of a review by the appellate body of the entire record of the proceeding on the challenge and written appellate submission of the Member of the OSN who was the subject of the challenge and of the Board of Trustees. Written appellate submissions and any reply submissions may be made by authorized representatives of the Member and of the Board of Trustees. Submissions are made according to whatever schedule is established by the appellate body. The decision of the appellate body either affirms or overrules the determination of the Board of Trustees on non observance of the Rules of Ethics in this Code by a Member of the OSN. The decision does not address the sanction imposed by the Board of Trustees. The decision of the appellate body, including a statement of the reasons for the decision, is reported to the Board of Trustees. The decision is binding upon the Board of Trustees, the Member who is subject of the challenge, the Ethics Committee and all other persons.

(g) Resignation. If a Member of the OSN who is the subject of a challenge resigns from the OSN at any time during the pendency of the proceeding of the challenge, the challenge is dismissed without any further action by the Ethics Committee, the NEC or an appellate body established after an appeal; the entire record is sealed; and the Member may not reapply for membership in any class. The Board of Trustees may authorize the Ethics Committee to

communicate the fact and date of resignation, the name and address of the Member who resigned and the fact that a challenge pursuant to the Code of Ethics was pending at the time of the resignation. Such communications shall not reveal the nature of the challenge. In addition, the Board of Trustees may authorize the Ethics Committee to communicate the fact and date of resignation, and the fact and general nature of the challenge on which a proceeding was pending at the time of the resignation, to, and at the request of, an entity engaged in the administration of law or the regulation of the conduct of physicians, in a proceeding that relates to the subject matter of the challenge, provided; however, that entity is a law enforcement agency, physician licensing authority, medical quality review board, professional peer review committee or similar entity.

(h) Overriding Reporting Requirement. Notwithstanding anything expressly or apparently to the contrary contained in this Code, the OSN shall report such information, to the Medical and Dental Council of Nigeria (MDCN) or other agencies, and in such form and manner and frequency as may from time to time be prescribed by the relevant laws and regulations of those bodies and of Nigeria.

RESEARCH IN OPHTHALMOLOGY AND VISION

Research in ophthalmology and vision sciences encompasses support for basic science and clinical research focused on meeting the local and global needs of the public and on developing new, socially acceptable and cost effective therapy for conditions that are now without effective treatment.

The objectives of research in Ophthalmology and vision sciences are to encourage and promote basic sciences and clinical research directed to an increased understanding of the eye and vision, development of procedures for prevention, early diagnosis and appropriate treatment of abnormalities and diseases affecting the eye and visual process. Scientific studies leading to new treatments for conditions that are without effective prevention and treatment shall also be undertaken.

As of now very little relevant research is being undertaken but it must of necessity become a priority when the clinical capacities are up and running.

The research priorities can be divided into three broad groups.

A. OPERATIONAL RESEARCH

Operational Research identifies modalities for efficient and effective use of resources and appropriate interventions. It responds largely to challenges posed by the fact that technology exists for preventing and treating/reversing visually impairing ocular disease and conditions, but for a variety of reasons, usually social, cultural, organizational or economic, large populations are not benefiting from this knowledge. A classic example is cataract, the single largest cause of blindness in the world. Operational research opportunities include ways in which to make surgical treatment less costly and more widely available. Operational research opportunities will generally yield useful, practical knowledge in the short- to medium-term. At present, there is little investment in operations research of visual problems, despite enormous opportunities for return on that investment. Operations research, particularly applied to delivery of cataract surgical services, is probably the single greatest research opportunity at present, and would yield enormous benefits to global blindness prevention programs in the near term.

B. EPIDEMIOLOGIC RISK PROFILE:

Epidemiologic studies include carefully designed, randomized trials (e.g., the relative ease, success, cost and benefit of aphakic vs. pseudophakic surgery; or phacoemulsification vs. extracapsular sutureless surgery). The benefits of such clinical studies can be expected in the short-term.

More innovative epidemiologic studies seek to identify underlying causal factors of human disease (e.g., why does blinding trachoma disappear “spontaneously” with seemingly small improvements in socioeconomic status?; or why do some, seemingly genetically similar populations suffer radically different rates of cataract?). Such classic epidemiologic studies (migrant studies, twin studies etc.) are powerful tools for obtaining biologically important insights. A classic example was the recognition that the use of diethylstilbesterol in mothers was responsible for the subsequent epidemic of vaginal cancer in their offspring.

Epidemiologic studies seeking to identify causal environmental/behavioral agents are generally medium-term endeavors.

OPERATIONAL AND EPIDEMIOLOGIC RESEARCH, which are neither well recognized nor well funded, offer the most immediate opportunities for facilitating blindness prevention today and in the short- to medium-term.

C. BASIC BIOLOGIC RESEARCH

Basic “mechanistic” research seeks to understand biologic mechanisms. Fundamental research discoveries are often serendipitous, but when they occur, may provide dramatic new modalities for understanding and preventing disease. Understanding lens physiology may one day provide insights that will permit prevention of cataractogenesis. Such research is generally of a long-term nature.

RESEARCH OPPORTUNITIES AND DIRECTION FOR NIGERIA OPHTHALMOLOGY

A. CLINICAL CONDITIONS

1. CATARACT

Cataract is the leading cause of blindness in Nigeria. The blindness is easily reversible by simple intervention – cataract surgery. The greatest problem is access by majority of Nigerians to sight restoring cataract surgery. The few ophthalmologists in the country have low output and the cataract surgical rate is very poor. Majority of our people living in poor conditions have no choice but to patronize the itinerant traditional healers who perform couching. This ancient procedure still thrives even in the biggest cities such as Lagos, Ibadan Kano and Kaduna. The primary challenge, from this perspective, is to reduce the cost and increase the efficiency of cataract surgery (with excellent sight restoring outcome), and find ways to provide these resources to poor living in remote rural areas or urban slums. These problems can respond to short- to medium-term operations research, including delineation of the level of education and training needed by eye health workers delivering cataract surgical services.

Preventing cataractogenesis requires innovative epidemiologic studies seeking factors that increase the risk of disease (short- to medium-term) and mechanistic studies of lens biology (medium- to long-term).

RESEARCH OPPORTUNITIES

a) Short-term (largely analytical):

- i Estimate the “burden of disease” posed by cataract, adjusted for differing levels of visual demands and visual deficit.
- i Compare the cost-benefit of cataract surgery performed at different levels of visual acuity (adjusted for visual demands)
- i Identify those factors responsible for variations in “per surgeon” cataract surgical rates (financing, facilities, expectations, culture, training, patient demand) adjusted for the age distribution of the population, the visual criteria justifying surgery, etc.
- i Assess factors that determine local indications for cataract surgery, and their appropriateness
- i Identify constraints to cataract surgical manpower (number of physicians/ophthalmologists trained; proportion adequately trained in modern pseudophakic surgery)
- i Identify resources and incentives required to motivate/train existing cataract surgical manpower to better meet quality standards and higher surgical volumes, and to provide services to the less accessible poor.
- i Develop simple methods for monitoring and evaluating surgical outcomes and benchmarking these against quality standards
- i Mathematically model alternative approaches to best meet today’s demand/needs, and those of the future (given changing demographics, visual demands, geographic distributions of patients and providers, reimbursement schemes and technology)
- i Compile and assess data on the severity and extent of cataract visual impairment and blindness attributable to different types of cataract (may require additional, sophisticated – if relatively small – population surveys)

b) Short- to Medium-Term

Largely operational research directed at increasing the amount of effective, high-quality cataract surgery provided to those presently underserved, primarily by identifying ways in which to reduce the marginal costs of cataract surgery and increase geographical and financial access to effective surgical services):

- i Devise and evaluate alternative approaches to increasing access of underserved populations to trained cataract surgeons:
 - Incentives for/requirements of ophthalmologists (mandatory service in underserved areas at completion of training; regular rotations to underserved areas)
 - role of non-physicians/non-ophthalmologists in delivering care to populations suffering a chronic paucity of trained ophthalmic surgeons (alternative formulation: “What is the minimal education, training and experience required to perform different roles in the delivery of safe and effective cataract surgery, including the surgery itself?”)
 - role and impact of certification and credentialing, CME, and clinical guidelines on performance standards and outcome
- i Identify ways to minimize costs associated with each component of cataract surgery (preoperative workup; facilities; equipment; supplies and consumables [sutures, visco-elastics, IOLs]; personnel, etc.), including alternative and emerging surgical techniques/ technology
- i Determine longer-term (3 to 10 years) post-operative outcomes following alternative surgical approaches
- i Develop and test ways to optimize case-finding and generate patient demand (compliance)
- i Identify the attributes that distinguish those systems for delivering services that are effective and efficient
- i Compare cost-benefit trade-offs between techniques that reduce the need for follow up (primary posterior capsulotomy; preoperative/interoperative antibiotics; greater precision in determining IOL power; multi-focal lenses)
- i Evaluate alternative cost recovery mechanisms and their ability to contribute to long-term sustainability of local cataract surgical services.
- i Compare the cost-effectiveness of alternative organizational schemes for maximizing “throughput” of the operative process (one vs. multiple operating tables; maximal delegation of responsibility) suitable to local conditions.
- i Design and test pricing and marketing strategies that result in sustainable cataract surgical programs (cross-subsidization between higher and lower fee facilities), adjusted for the elasticity of pricing/disposable income distribution of the local population (e.g., general ability/willingness to pay 1-3 months wages for cataract surgery)

b) Medium-to-Long-term (progress in understanding lens biology and developing interventions that reduce the incidence/progression of cataract) :

- i Search for epidemiologic insights into environmental causality (e.g., compare environmentally disparate, genetically similar populations with different age-specific incidences of clinically significant cataract)
- i Conduct basic (“mechanistic”) lens research to identify the biologic basis of different forms of cataract.

2. Trachoma

In some parts of Nigeria especially in the Northern areas, Trachoma is next to cataract as a leading cause of avoidable blindness and visual impairment. Recent analyses suggest the burden on quality of life attributable to the discomfort of trichiasis may be as great as that traditionally attributed to the reduction in visual acuity.

Active (and blinding) trachoma occurs in a highly focal pattern among poor populations. While it is reasonably well established that recurrent reinfection with *Chlamydia trachomatis* results in chronic inflammation, scarring, trichiasis, and corneal opacification, the exact relationships between these entities is unclear. What is particularly vexing, but serves as grounds for optimism and research-based enlightenment, is the way in which trachoma has spontaneously disappeared from many areas of the world: not just Appalachia (US) or Finland (in the 1940s), but more recently Indonesia, Mali, and much of India and Pakistan. Saudi Arabia experienced a dramatic decline in incidence, associated with infrastructure development (roads, water supplies). It would appear, in most instances, that early, relatively modest increases in socio-economic status are related to critical changes in the environment and/or behavior that brought this about.

Epidemiologic studies have identified personal hygiene and communal sanitation as potentially important determinants of blinding disease. These and other insights resulted in the recently launched *GET 20/20* (Global Eradication of Trachoma by the Year 2020) and a public-private collaboration, the *ITI* (International Trachoma Initiative). These are based on the (SAFE) **S**(urgery), **A**(ntibiotic), **F**(acial cleanliness/facewashing), **E**(nvironmental Cleanup) strategy: “surgery” to correct trichiasis and reduce the burden of existing lid scarring; “antibiotic,” particularly highly effective Zithromax, to eliminate an individual’s *C. trachomatis* infection; and “face washing” (to ensure facial “cleanliness”) and “environmental cleanup” to reduce the risk of infection/reinfection. The effectiveness of each of the components of the “SAFE” strategy, alone and particularly in combination, remain poorly documented; a better understanding of the value of these interventions, particularly their timing for maximal synergy, should lead to more effective outcomes. Five important, generic research issues relate to:

- 1) Improving surgical outcome of trichiasis surgery. At present, the relapse rate, even for well-trained ophthalmic surgeons, is high.
 - 2) Elucidating the role of acute/recurrent/chronic infection in the pathogenesis of conjunctival scarring.
 - 3) Documenting the dynamics of infection/reinfection (e.g., what serves as the reservoir of *C. trachomatis* following mass antibiotic treatment; how is it reintroduced into a community; how does it spread between individuals?)
 - 4) Determining what is required to sustain the reduction in prevalence of infection and active disease following antibiotic treatment (and thereby block development of blinding trachoma?)
 - 5) Demonstrating how SAFE can be most effectively delivered
- While *ITI* and *GET 20/20* have settled on the SAFE strategy, successful global eradication programs (e.g., smallpox) have demonstrated the critical importance of maintaining a vigorous, parallel research program to enhance program effectiveness and overcome obstacles to interventions that prove ineffective.

RESEARCH OPPORTUNITIES

A. Trichiasis Surgery

a) Short-Term:

- i Identify factors that influence the recurrence of trichiasis following seemingly successful lid surgery?
- i Develop improved surgical approaches (by employing the latest plastic surgery techniques), and test these in clinical trials.
- i Identify barriers to surgical uptake and ways to reduce cost and increase access (e.g., minimal equipment and supplies; efficient and effective procedures and the training of lid surgeons; ways to increase demand/compliance).
- i Test simplified systems of surgical audit and evaluation of surgical outcomes.

b) Medium- to Long-Term:

Identify:

- i The pathogenesis of lid scarring (role of infection, immunologic and inflammatory response, etc.)
- i The optimal time in the evolution of trachomatous scarring to intervene surgically.

B. Infection and Antibiotics

a) Short-Term:

Determine the:

- i Origins of reinfection (latent infection; re-introduction by visitors or spread from adjacent communities)
- i Degree of treatment coverage vs. impact/sustained reduction in infection and progression of disease under differing conditions of endemicity
- i Relationship between the frequency of antibiotic (Zithromax) dosing and its duration of impact (reinfection/re-emergence of active or scarring diseases)
- i Cost-effectiveness/ cost-benefit of antibiotic use, based on benefits to both ocular and non-ocular diseases (STD, respiratory disease, etc.)

Medium-Term:

- i Determine by whom, and for how long and how intensively, should antibiotics be used for sustained impact (e.g., R/x only children; mothers and children; the family; or the whole community? How often and for how long?)

C. Face Washing/Environmental Sanitation

b) Short- to Medium-Term:

Determine:

- i The key personal hygiene/environmental factors that are responsible for infection/reinfection
- i The degree to which “F&E” has an additive (synergistic?) benefit when added to treatment with antibiotics
- i The long-term impact of alternative “F&E” interventions
- i Which factors (behavioral) determine compliance and adoption of personal/community “F&E” interventions
- i Whether markers of facial “cleanliness” can identify populations in which the promotion of “face-washing” is unnecessary and redundant

Two Potential (Model) Studies:

1) After reducing the prevalence of infection with baseline systemic antibiotics, compare the impact of alternative F&E strategies. These should cover populations of varying density and over varying distances from a central point in order to trace the rate and route of reinfection. (This will establish whether a wider F&E “cordon sanitaire” more effectively reduces reinfection, by comparing route and reinfection rate from the periphery to the center of the intervention population; and with it, the source of reinfection. Altering the intensity and extent of F&E strategies should reveal the synergy of F&E when added to the use of antibiotics, and the potential value of F&E in sustaining [or maintaining] reduced levels of infection/reinfection.)

2) Once an optimal F&E strategy is identified (in [1] above), combine it with alternative antibiotic dosing regimens (frequency; duration) to identify the ideal F-A-E intervention, for differing levels of endemicity and population density, and the duration of antibiotic use needed before F&E can sustain control on its own.

D. Other

Short-Term:

- i Calculate the cost-benefit/cost-effectiveness of alternative interventions
- i Refine estimates of the “burden of disease” caused by trachoma, including non-ocular disease

Medium-Term:

- i Develop simplified, inexpensive diagnostic tests for infection suitable for program evaluation and monitoring

Long-Term :

- i Elucidate the pathobiology of the disease (interactions between microbe and host)
- i Develop a vaccine (against infection; against inflammation and blinding scarring)

3. Onchocerciasis

Global programs over the last three decades have dramatically reduced the incidence of new infections with *onchocera volvulus* and their progression to blindness. Through a combination of environmental interventions and widespread treatment with Mectizan, onchocerciasis should cease to be a cause of new blindness reaching a level of “public health significance” by 2010.

This does not mean that further research is not needed. Most modeling studies suggest that at present coverage rates (65%), it will take 40 years before Mectizan distribution can be safely discontinued. At 80-85% coverage, which may prove possible with more intensive and effective delivery systems, the program must still be sustained for more than 25 years. In addition, new drugs are needed that will:

1. Have safe and effective macrofilaricidal activity. Their use would dramatically shorten the need for sustained, repeated microfilaricidal administration
- 2) Provide a backup to Mectizan should microfilaria develop resistance
- 3) Prove safer for use in populations with heavy, co-existing infections
- 4) Allow for treatment of children and pregnant women, thereby increasing coverage (leaving a smaller reservoir of persistent infection)

To enhance and sustain large-scale treatment (to exceed 80 million people annually) requires alternatives to, or strengthening of, the present system of “Community Directed Treatment Intervention” (CDTI).

A potentially important and recent observation (Science, March 8, 2002, “The Role of Endosymbiotic Wolbachia Bacteria in the Pathogenesis of River Blindness”) suggests that Wolbachia, an endosymbiotic bacterium present in all developmental stages of O. volvulus, are required for production of microfilaria and for much of the inflammatory reaction associated with microfilarial death. As these bacteria are susceptible to antibiotics, it may open a new approach to control of onchocerciasis.

Research Opportunities

Short-Term (primarily operational research, much of which is already ongoing):

- i Investigate serious side-effects of Mectizan among populations in loa loa endemic areas
- i Determine the role of interactions between Mectizan, alcohol consumption, and exposure to other toxic substances and serious sideeffects observed in those under treatment (especially encephalopathy)

Medium-Term (primarily delivery of drugs):

- ï Develop ways to ensure long-term sustainability and to increase coverage/compliance of Mectizan treatment programs
- ï Identify issues related to the use of CDD (volunteer community distributors) and complementary programs addressing other needs that might be added onto this unique delivery system (reaching otherwise underserved populations)
- ï Follow up preliminary data that suggests increasing the frequency of Mectizan dosing might further block embryogenesis (more fully blocking transmission). Comparisons between alternative treatment regimens might identify ways to reduce the duration required by intervention programs.

Long-Term:

- ï Develop a safe macrofilaricide
- ï Develop an alternative to Mectizan in case resistance should develop
- ï Delineate the role of Wolbachia in the pathogenesis of river blindness, and the potential role of alternative interventions (antibiotics that destroy the bacteria; drugs that block its inflammatory effects; etc.)
- ï Evaluate the long-term impact of Mectizan on the incidence and severity of retinitis/optic neuritis

4. Xerophthalmia

Xerophthalmia was traditionally a major cause of visual disability among young children, particularly in some parts of Africa, South and Southeast Asia. Recent studies confirm it is also prevalent, primarily as night blindness, among women of reproductive age. The discovery that vitamin A deficiency (VAD), the cause of xerophthalmia, is far more prevalent than clinically evident ocular complications, and that mild levels of deficiency dramatically increases infectious morbidity and mortality, have resulted in global initiatives (UNICEF, WHO, USAID) to control micronutrient malnutrition. As a result, over 70 countries have launched VAD control programs. UNICEF estimates these reach 80% of their target childhood populations in over 40 countries. As a result, many countries have witnessed a dramatic decline in the incidence of xerophthalmia and related blindness (formal assessment in Indonesia suggests a 92% reduction in the prevalence of active disease).

The primary constraint to VAD control is a cost-effective method for improving vitamin A status. We now know that one cannot normalize vitamin A status by simply changing dietary habits of populations dependent upon a vegetable diet, because the bioavailability of vitamin A from carotene-containing fruits and vegetables is much lower than previously thought.

Fortification of dietary staples would provide a cost-effective means of supplementing diets with additional vitamin A. Unfortunately, few centrally processed products, in which vitamin A is stable, are consumed by high risk populations. Identification of such potential vehicles for fortification remains a high priority.

The single most important intervention strategy remains periodic administration of high-dose supplements (generally once every 3-6 months). The supplements themselves are extremely inexpensive, but distributing them is not. Many countries have successfully grafted vitamin A distribution onto NIDs (“National Immunization Days”) utilized to eradicate polio through mass immunization. As many countries have successfully eradicated polio, NIDs are being phased out and alternative delivery schemes need to be adopted. Increasingly, other micronutrient deficiencies are being recognized as important targets for control, and wherever possible, combined with vitamin A supplementation. But there is little data on the potential interactions between co-administered multiple micronutrients.

Research Opportunities

Short- to Medium-Term:

i Develop better tools for population assessment of vitamin A status

Medium-Term:

- i Develop and test alternative supplementation strategies (e.g., use of market forces to propel and sustain programs)
- i Generate additional information on the role of vitamin A status in determining maternal mortality, and the impact of control of VAD
- i Conduct population-based trials to elucidate micronutrient-micronutrient interaction, and to establish appropriate supplementation and fortification strategies for populations with different degrees/states of micronutrient deficiency

Medium- to Long-Term:

- i Determine the impact of very early (birth) vitamin A supplementation on the developing immune system, as this may have enormous consequences for morbidity and mortality, and thus for the justification of vitamin A control programs
- i Develop, refine and evaluate the value of crops bio-engineered to produce beta-carotene and/or retinol

5. The Glaucomas

Collectively, glaucomatous optic nerve damage accounts for a significant amount of global visual impairment and blindness. Of the many types of glaucoma, primary open angle glaucoma (POAG) is the most prevalent in Nigeria and have engaged the Committee's considerations.

Until such time as the potential cost-benefit advantages of intervention for the glaucoma becomes competitive with those for cataract, trachoma or onchocerciasis, they are left to future consideration. Indeed, there is considerable concern that even if cost-effective strategies become available for identifying patients with open-angle glaucoma, the complications associated with surgical intervention and failure to produce immediately discernible benefits could well lead unsophisticated populations to become discouraged from seeking any surgical interventions (including cataract surgery).

There is need to explore this area and see how to improve awareness of glaucoma; find how Nigerian patients can be made to accept medical or surgical intervention and other factors that may help the understanding of the disease and its management in the Nigerian population.

6. Diabetes Mellitus & Retinopathy

Diabetes mellitus is becoming increasingly important as a cause of blindness and low vision in Nigeria. More patients with diabetes are being diagnosed early and have increased life expectancy because of better access to healthcare. Thus increasing numbers of diabetic eye complications are seen in the clinics. In the almost total absence of fluorescein angiography in the country, very little reliable information is available on the diabetic retinopathy.

Research Opportunities

- Determine the impact of diabetes as a cause of blindness and low vision in the Nigerian population.
- Epidemiologic studies to identify environmental/behavioral factors that contribute to societal variations in risk .
- Document population variations in risk for Diabetic Retinopathy to elucidate genetic and environmental markers/pathogenetic mechanisms.
- The prevalence of Haemoglobin S in the Nigerian population is about 23 per cent. It would be interesting to find out

- i. whether these are more prone to diabetic retinopathy if there is concomitant diabetes mellitus.
- ii. whether the presence of haemoglobin S is an additional risk factor for diabetic retinopathy or a prognostic factor.
- Treatment of diabetic retinopathy is effective. Operations research may make it cost-effective if targeted at those at high risk because of genetic or nutritional factors. Operational research also provides opportunities for extending retinal photocoagulation to poor populations suffering from diabetic retinopathy.
- The nature of angiogenesis and its relation to antioxidant intake may better be studied in micronutrient poor populations.
- Better tools are needed for defining risk, early disease, and tracking progression.

7. Refractive Errors

Refractive error is the most common ocular abnormality, a situation exacerbated in many in Nigeria, by lack of access to refractive services and low-cost spectacles. In many parts of Nigeria there are social and cultural restraints to wearing of spectacles.

Research Opportunities

- Determine the burden of visual impairment caused by uncorrected refractive errors
- Identify social and cultural constraints to utilizing refractive services and spectacles
- Experiment with alternative organizational systems and infrastructural support for the sustainable provision of appropriate lowcost spectacles (e.g., micro-credit enterprises, formal refraction vs. patient self-selection from among spectacles of varying correction, individually ground lenses vs. snap-in spherical equivalent)
- Develop protocol for the education. Training and certification of refractionists and low-cost spectacle providers.
- Enroll high risk populations into epidemiologic studies and randomized clinical trials seeking environmental/behavioral etiologic factors and effective strategies for reducing the incidence/progression of refractive error.
- Analyze the cost-benefit and cost-effectiveness of alternative interventions (including spectacles), considering their economic impact.
- Investigate alternative interventions for reducing the incidence/progression of refractive error.
- Apply evolving technologies to the treatment of refractive error in poor populations

Research Goals: Prioritization and the Means to Move Forward

A. Evaluative Research

“Research,” by definition, is the systematic discovery of new knowledge. While major, fundamental insights often arise from the unfettered search for new knowledge, the more urgent and achievable goals of reducing blindness and low vision in Nigeria will be best served by focusing action on

- a) the systematic elucidation of their major causes of needless visual impairment,
- b) coordinated, energetic and innovative approach toward understanding and overcoming obstacles to their resolution.

1. Burden of Visual Impairment & Quantifying the “Burden” of the pathology

Knowing the primary causes of visual impairment is critical to prioritizing the interests of the eye care community, mobilizing resources, and influencing policy. A number of good “blindness”

surveys have been conducted during the past decade but Nigeria still has no overall picture of the state of affairs. In this day and age, mere “prevalence” of disease is inadequate to move policymakers or even affect research or programmatic allocations. Health priorities are now established on the basis of “burden of disease,” a concept that more dynamically captures visual impairment. With the new Nigerian Blindness survey which has just commenced, it is hoped that a clearer picture will emerge.

To be meaningful for ophthalmic conditions, we need to know:

- a. The distribution of visual impairment (for most practical purposes, in the better eye) by severity and age. The younger the onset, and the more severe the impairment, the greater its “burden.” Permanently impaired vision in a young child will cause a greater “burden of disease” because this burden will be born for more years than when the impairment had its onset in old age. Hence senile cataract, which may appear to be the overwhelming cause of visual impairment, can become less important, relatively, to childhood causes like injuries or xerophthalmia, or mid-adult causes like trachoma.
- b. The impact of different levels of visual impairment, at different ages, on “quality of life.” Very little work has been done in this regard. Almost all of the (meager) correlations between vision, impairment and quality of life come from studies on older individuals (primarily with cataract) in wealthier countries. A better delineation of these relationship is critical to establishing “burden of disease” estimates

B. Operational Research

At least two major issues are critical to dealing with “avoidable” visual impairment:

1. Generating the capacity to meet the population’s need for interventions,

Action Item: There is a continuing need to refine approaches to cataract surgery (trichiasis remediation, etc.) to simplify the procedure; reduce the need for sophisticated equipment, facilities, and supplies; and minimize the training and experience required by the operating “surgeon” but remain compatible with high-quality outcomes whether cataract surgery or treatment for trachoma. In most developing countries, unoperated cataract remains the single most common cause of visual impairment and blindness (more sophisticated data is still needed to determine its relative “burden of disease”). Enormous progress has been made in reducing the time, cost, and complexity of cataract surgery, for example, and in ways to motivate populations to seek care. But the gap between needed care and available care remains, for most poor countries such as Nigeria, enormous. For most of the rural and poor countryside there will never be adequate access to fully qualified ophthalmic expertise if one relies on the procedures and techniques employed in wealthy countries.

2. Capacity and quantity of activity is not itself adequate. Outcomes, whether of cataract surgery or trachoma intervention, must be successful and approach “international” standards and expectations. These improvements must address both short- and long-term results, and “quality of life” indicators of the recipient populations.

Action Item: There is still a paucity of data on the outcome of ophthalmic interventions in developed and developing countries alike. But the limited resources of developing countries make it imperative that resources are not wasted. Every country needs to monitor outcomes of its interventions, primarily to identify where and why these might fall short, and thereby prompt remedial intervention. It makes sense for countries with similar characteristics to jointly develop, test, and refine common protocols, as a spur to action and as a means for sharing “lessons.”

Nearly every ocular condition would benefit from basic discoveries related to aetiology, treatment, and prevention: from macular degeneration, for which little can presently be done, to cataract, where prevention might well prove far more cost-effective and reduce dependence on readily

accessible care. All countries can participate in discovery research, though most such work will be funded and conducted by investigators in wealthy nations (where appropriate, in collaboration with colleagues from poorer countries). “Discovery research,” while critically important, is of tertiary relevance to the funding priorities of a poor country such as Nigeria. Investments in evaluative and operational research are likely to provide more immediate returns. However, developments or discoveries in wealthy countries that impact on ocular conditions in Nigeria are important:

- Azithromycin for trachoma
- and Ivermectin for onchocerciasis are two examples.

Action Item: A consortium of ophthalmic scientists from wealthy and poor countries should systematically monitor new drugs, discoveries, and technologies.

ADVOCACY FOR THE PRESERVATION AND RESTORATION OF VISION

Advocacy for Eye Care in Nigeria

Advocacy for Eye Care in Nigeria encompasses those activities that support qualitative Eye Care delivery morally and materially, within the country and beyond. It taps into all available resources, governmental and non-governmental, financial and in kind, private and public, individual and corporate to aid the Global Initiative for the Elimination of Avoidable Blindness and low vision-VISION 2020 and other efforts to preserve and restore vision.

Objectives

Advocacy is designed to focus attention on the need for services and resources to eradicate avoidable vision loss and blindness. The Ophthalmological Society of Nigeria will collaborate with International ophthalmological organizations, non-governmental agencies and governments to support the World health Organization/International Agency for the Prevention of Blindness-Vision 2020, as well as additional programmes to preserve vision and prevent blindness.

This will be achieved by

- Increasing the awareness nationwide of blindness and low vision among arms of government - federal, state and local governments and the organized private sector.
- Enhancing the awareness by governments of the need for public services and programmes to preserve vision and prevent blindness as an important priority on the national health agenda.
- Encouraging equitable distribution and efficient utilization of existing resources for the restoration of vision and blindness prevention.
- Increasing the support from governments and other stakeholders for initiatives to prevent visual disability and blindness.
- Obtaining support for the overriding goal of ensuring that all people have access to affordable, quality eye care.
- Supporting specific programmes for early intervention and timely care of children with eye disease and potentially blinding conditions.
- Promotion of quality services to individuals with diseases such as cataract, glaucoma, diabetic retinopathy, age related macula degeneration as well as developmental and degenerative eye disease.
- Promoting awareness of the need to prevent eye injuries.
- Encouraging services and rehabilitation programmes to enhance quality of life for people with blindness and low vision.

Plan of Action

The Ophthalmological Society of Nigeria has constituted a Task Force for The Advocacy for Preservation and Restoration of Vision, which will undertake the following lines of action:

1. Awareness and Commitment by Ophthalmologists
To make every member of the OSN aware of public need related to visual disability and blindness and committed to helping address this need.
2. National Statistics and Priorities
To ensure the successful outcome of the National Blindness Survey which will provide the much-needed statistics of people with disability and blindness.
3. Economic Benefit
To collect and analyse relevant data to convince the news media and key government officials of the economic benefit of ophthalmologic care to prevent blindness and low vision.
4. Alliance

To develop a close working relationship with the IFOS/ICO, IAPB, WHO and non-governmental organizations and to collaborate with them to persuade national governments to support efforts to eliminate avoidable blindness and low vision and to preserve and restore vision.

5. Vision 2020

To work with local National Programme for the Prevention of Blindness Committees (NPPB) to motivate and mobilize ophthalmologists and health care personnel to participate in the Global Initiative for the Elimination of Avoidable Blindness and Low Vision - VISION 2020. At the moment the scope and level of activity of the National Programme for the Prevention of Blindness and Vision 2020 within the country is far from being satisfactory. There is an urgent need to have a full time Executive Director for the NPPB who will coordinate all activities (fund raising), Networking, information dissemination and other activities that would enhance and promote Eye Care /Prevention of Blindness activities in the country. This OSN is in support of this line of action.

6. Screening Programmes

To work with interested stake holders, non-governmental organizations and others to establish programmes for screening infants and children, patients with diabetes mellitus and adults who are susceptible to glaucoma and other eye diseases for the purpose of early detection and enhanced treatment of eye conditions and diseases associated with vision impairment and blindness.

7. Eye Care Programmes

To coordinate with nongovernmental organizations and others to establish appropriate national programmes for treatment of corneal opacities, cataract, trachoma, glaucoma and other eye diseases.

8. National /State) Advisory Boards for Eye Care /Blindness Prevention

The establishment of a National/State Advisory Board for Eye Care in every state and at Federal level with participation of members of the public and organized private sector will help to share the vision of sight for all Nigerians, help in information dissemination and enhance the feasibility and visibility of Blindness Prevention Programmes within the country.

9. Vision Unit in The Ministry of Health

To work towards the establishment of a Vision Unit in the Federal and State Ministries of Health to be headed by a public health Ophthalmologist.

IMPLEMENTATION

- ❖ Inauguration and launching of Advisory Committees at the National, State and Local Government levels.
- ❖ Development of information dissemination instrument suitable for print and electronic media including jingles.

Encouragement of and open demonstration of commitment to eye care by political and other society leaders (for instance, the 'Head of State' signing a form pledging to donate his eyes at death) will have tremendous positive impact for the cause of eye banking in Nigeria.

LINKAGES AND PARTNERSHIPS

Human Resource Development and Capacity Building

Elimination of avoidable blindness and low vision, Vision 2020 – The Right to Sight will need partnerships with other stakeholders. Specifically for human resource development and capacity building. There is the need for linkages and partnerships with training institutions, certifying colleges, other eye care providers and sister professional organisation.

1. Linkages With National Postgraduate Medical College of Nigeria & The West African College of Surgeons.

There is a formal linkage with the Faculties of Ophthalmology of the National Postgraduate Medical College of Nigeria and the West African College of Surgeons whereby the OSN is represented on the Faculty Boards and vice versa the Faculties are represented on the National Executive Council of the OSN. This ensures that both sides participate in the decision making processes and such decisions are implemented at every level. Such linkage is particularly important in ensuring that the curricula of both examination bodies conform to the Strategic Plan of the Ophthalmological Society- Vision For The Future-Nigeria.

The Nigerian Journal of Ophthalmology is a joint venture of the Faculty of Ophthalmology, National Postgraduate Medical College of Nigeria and the Ophthalmological Society of Nigeria. It is the hope of the OSN that through the Ophthalmological Society of Nigeria Foundation, more support and funding will go to the Faculties in pursuit of those areas of research priorities as enunciated in the Society's Strategic Plan, Vision For Future-Nigeria.

2. Twinning

The Ophthalmological Society of Nigeria believes that equal benefit can come from sustained mutual contact between individuals, eye departments, academic institutions or societies whether these are within cities already twinned. This will lead to greater understanding, more rapid exchange of information, considerable material advantage and in many instances changes of practice for the better.

Already a twinning relationship exists with the All India Ophthalmological Society and arrangements are underway to establish similar relationship with the Ghana Ophthalmological Society and East African Ophthalmological Society.

3. Partnerships With International and Supranational Organizations

I. THE IFOS/ICO – Milestone for Ophthalmology in Nigeria

The IFOS/ICO has been a great catalyst in the process of engineering improvement in the quality of training and practice of Ophthalmology in Nigeria. Within a year of the visit of the ICO to training institutions in Nigeria, tremendous, almost volcanic like activities, aimed at changing ophthalmological training and practice in Nigeria have commenced. Already the ICO has committed a lot of funds to establish Information Technology in six Training Institutions in Nigeria. It is expected that this will lay a solid base for further developments which will bring the practice of ophthalmology to internationally acceptable standards. This is a milestone for Ophthalmology in Nigeria and it is against this that all future activities will be judged. The OSN will strengthen this linkage and explore the benefits to the fullest.

Members in training will be encouraged to participate in the ICO's International Assessments for Ophthalmologists. These Assessments are of a high standard, internationally set and are therefore useful as a measure of the standard of knowledge of those entering the residency training programme in ophthalmology in Nigeria in relation to International Ophthalmology. It is also useful to record the achievement of a high standard of theoretical knowledge during the phases of residency training. The Basic Science Assessment is frequently taken before or early in residency training and the Clinical Sciences Assessment at the end.

II. THE IAPB and WHO

Through linkage with the International Council of Ophthalmology dividends are already accruing. The IAPB/WHO have nominated a center in Nigeria to be designated as the West African Regional Center for Training. These organizations are committed to the welfare of the people and the OSN will without reservation participate fully in their programmes.

VISION 2020 & WORLD SIGHT DAY

As part of the Advocacy for the Preservation and Restoration of Vision the OSN will coordinate the activities of the World Sight Day. It will ensure participation by all stakeholders at the activities marking the celebrations.

III. PAACO Now MACO (Middle-East African Council of Ophthalmology)

PAACO now MACO has been very supportive of the OSN and its programmes. The personal contributions of the president of MACO must be mentioned. He has ensured regular attendance at the meetings of the organization by providing sponsorship for members of the OSN and has made personal contributions through the ICO to the IT Project in Nigeria. He has also supported subspecialty training of Ophthalmologists and offered to train ophthalmic technicians in order that the Society will have capable hands to meet the challenges of modern advancements in technology. OSN will strengthen the linkage.

IV. AMERICAN ACADEMY OF OPHTHALMOLOGY (AAO)

The AAO has enormous educational materials for the training of Ophthalmologists and Continuing Medical Education. Linkage with the AAO has been made through the ICO. The first fruits of this relationship was the free shipment of the AAO's BCSC series to 18 training centers in Nigeria. The Linkage is therefore beneficial and worthy of consolidation.

V. NATIONAL LIBRARY & NATIONAL EYE INSTITUTE

Through the ICO arrangements linkages have been established with these two American institutions.

4. Partnership With International Non-Governmental Organizations (INGO) and Industry

In these times of ever increasing competition for limited government health care resources, partnership with INGOs and Industry can provide the necessary financial support for some of the objectives of the OSN strategic Plan, Vision for the Future-Nigeria. Some INGOs and Industry are already giving some assistance in this direction. Through the OSN Foundation this link will be further strengthened.

5. Others

The OSN will establish linkages and partnerships with other training, professional bodies and any other organization in the fulfilment of its objectives.

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VISION FOR THE FUTURE-NIGERIA

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APPENDIX I

CURRICULUM GUIDELINES FOR MEDICAL STUDENTS**1. Fundamentals and Principles of Ophthalmology**

A medical student should recognize external and internal ocular structures of the normal eye and to perform a basic eye examination. Anatomy with emphasis on applied anatomy would have been taught in first year of human anatomy.

A medical student should know the following:

- i) Essentials of ocular anatomy
- ii) Measurement of Visual Acuity
- iii) Assessment of papillary reflexes
- iv) Evaluation of ocular motility
- v) Use of the Direct Ophthalmoscope for assessment of the red reflex, optic nerve and
- vi) Drugs used to dilate the pupils for posterior segment examination
- vii) Perform and evaluate visual fields by confrontation.

The student should be able to define each of the following structures and provide relevant information regarding normal structure and function.

I. Ocular Anatomy

- a) Eyelids
- b) Sclera
- c) Limbus
- d) Iris
- e) Pupil
- f) Conjunctiva
- g) Cornea
- h) Extraocular muscles
- i) Anterior chamber
- j) Lens
- k) Ciliary body
- l) Posterior chamber
- m) Vitreous cavity
- n) Retina
- o) Macula
- p) Choroid
- q) Optic disc

II. Visual Acuity

Students should understand the purpose of measurement of near visual acuity with and without correction, and test for near visual acuity of the right eye, left eye, and both eyes.

Students should understand the concept of distance visual acuity testing with and without correction and with a pinhole, but not is expected to perform refraction.

III. External Inspection

Students should understand the external ocular anatomy and evaluate the position of the lids and inspect the conjunctiva, sclera, cornea and iris with a penlight

IV. Pupillary Reaction Testing

Students should measure the pupillary size and assess the direct and consensual pupillary reaction.

V. Ocular Motility Testing

Student should understand the importance of assessing ocular motility in the six primary directions.

VI. Direct Ophthalmoscopy

Student should understand the use of a direct ophthalmoscope and the importance of testing the patient's right eye with the ophthalmoscope held in the examiner's right hand, and left eye with the examiner's left hand. The student should understand the basic function of an ophthalmoscope including the need to adjust the focus.

VII. Pupillary Dilatation

Student should understand the need to pharmacologically dilate the pupils in order to facilitate the examination of the fundus. Student should understand the difference between retinal arterioles and retinal venules, the normal appearance of the optic nerve head and macula. Student should understand the normal retinal background is a uniform red-orange color due to pigmentation of the retinal pigment epithelium.

VIII. Intraocular Pressure Measurement

Student should understand the concept, but not actually measure pressure.

IX. Anterior Chamber Depth Assessment

Student should understand the concept.

X. Confrontation Field Testing

Student should understand the principle and the technique for determination of confrontation of visual field.

XI. Upper Lid Eversion

Student should understand how to evert the upper lid to examine for foreign bodies, evidence of chronic conjunctivitis, trachoma and vernal papillae.

XII. Fluorescein Staining of the Cornea

Student should understand fluorescein staining for an epithelial defect of the cornea.

XIII. Indications for Referral

Student should understand potential causes for reduced visual acuity, abnormal fundus appearance, and potentially other abnormal findings that would result in referral of the patient to an ophthalmologist for evaluation.

Competencies

Student should

- o Understand basic ocular anatomy
- o Measure near visual acuity.
- o Test for direct, consensual and afferent pupillary reactions.
- o Understand and master basic direct ophthalmoscopy.
- o Understand normal funduscopic appearance of the optic disc, macula and major vessels.
- o Understand the rationale and interpretation of test the red reflex.
- o Understand the importance of the dilated fundus examination.
- o Understand important causes of reduced vision, abnormal fundus appearance and abnormal findings that would result in referral of a patient to an ophthalmologist for evaluation.

2. Refraction and Contact Lens

Student should understand the following:

- (a) The human eye is an optical system.
- (b) The schematic eye.
- (c) Pupil size and its effect on visual resolution.
- (d) Visual acuity.

(e) Clinical measurement of visual acuity –Snellen fraction

ii) Refraction States (as it affects direct ophthalmoscopy)

a) Emmetropia

b) Myopia

c) Hyperopia

d) Astigmatism

e) Presbyopia and accommodation

iii) Spectacle Correction

a) Spherical lenses

b) Bifocals, trifocals, multi-focal lenses

iv) Special Lens Material

Clinically important features of contact lens –

- Optics

- Field of vision

- Image size

- Hard contact lens

- Flexible contact lens

- Therapeutic contact lens

-Intraocular Lens -Concept only

vii) Refractive Surgery

Concept only, with some knowledge of principles and indications.

viii) A Patient with Low Vision

Need for special rehabilitation with low vision optical devices.

Competencies

• Student should

o Understand emmetropia, myopia, hyperopia, astigmatism, and presbyopia

o Measure near central acuity

o Understand optical principles of contact lens, intraocular lens, and refractive surgery

o Understand the need for low vision rehabilitation***

3. Pediatric Ophthalmology and Strabismus

1 Anatomy of the Extraocular Muscles and their Fascia

Origin, course, insertion, innervation, and action of the extraocular muscles

a. Horizontal rectus muscles

b. Vertical rectus muscles

c. Oblique muscles

d. Levator palpebrae superioris muscle

e. Insertion relationships of the rectus muscles

2. Blood supply of the Extraocular muscles

a. Arterial

b. Venous

3. Fine structure of extraocular muscles

Fibre types

4. Anatomical implications

II. Amblyopia

1. Strabismic amblyopia

2. Refractive amblyopia

3. Form deprivation and occlusion amblyopia

III. Strabismus

1. Concomitant strabismus
2. Incomitant strabismus
3. Heterotropia
 - a. Esophoria: inward deviation - not manifest
 - b. Esotropia: inward deviation - manifest
 - c. Exophoria: outward deviation - not manifest
 - d. Exotropia : outward deviation- manifest
 - e. Hyperphoria: upward deviation - not manifest
 - f. Hypertropia: upward deviation- manifest
 - g. Hypophoria: downward deviation - not manifest
 - h. Hypotropia: downward deviation -manifest

IV. Examination of the eyes

1. Visual acuity and amblyopia
 - a. Newborns
 - b. Infants to 2 years old
 - c. 2 to 4 years old
 - d. 4 to 5 and up

V. Strabismus Testing

1. General Inspection
2. Corneal light reflex
3. Cover test
2. Other tests
 - a) Red reflex
 - b) Ophthalmoscopy
 - c) Pupillary testing

VI. Leukocoria

- i) Retinoblastoma
- ii) Persistent Hyperplastic Primary Vitreous
- iii) ROP
- iv) Cataract

VII. Management or referral

1. Amblyopia
2. Strabismus
3. Leukocoria

Competencies

- Student should
 - o Perform visual acuity testing in each eye in preverbal children by fixation and recognizing fixation preference if present.
 - o Measure visual acuity in children 2-5 years with Allen cards with each eye.
 - o Recognize and characterize ocular misalignment (strabismus) by performing Hirschberg testing
 - o Recognize leukocoria and importance
 - o Understanding referral for leukocoria, amblyopia, and strabismus in a child as an urgent issue

4. Neuro-Ophthalmology:

I. Anatomy

1. Bony Anatomy

2. Vascular Anatomy
3. Afferent Visual Pathways
4. Ocular Motor Pathways
5. Facial Motor and Sensory Anatomy
 - d. Trigeminal Nerve
 - e. Facial Nerve
6. Ocular Autonomic Pathways
 - a. Sympathetic Pathways
 - b. Parasympathetic Pathways

II. Neuroimaging

1. Glossary
2. History
3. Basics of MRI & CTscan
4. Fundamental Concepts in Localization

III. How to examine the patient

1. Visual Acuity testing
2. Visual Field testing - Confrontation
3. Extraocular Motility
4. Direct Ophthalmoscopy

IV. How to interpret findings

1. Pupillary disorders
 - a. dilated pupil
 - b. tonic pupil
 - c. afferent pupillary defect
 - d. unilateral small pupil
2. Neuro- motility abnormalities
 - a. cranial nerve palsies
 - (1) III nerve
 - (2) IV nerve
 - (3) VI nerve
 - b. other cranial nerve palsies
 - (1) V cranial nerve
 - (2) VII cranial nerve
 - c. Myasthenia Gravis
 - d. Intranuclear ophthalmoplegia
 - e. Nystagmus
3. Optic nerve disease
 - a. Optic disc elevation
 - (1) Congenital anomalous disc elevation
 - (2) Papilledema
 - (3) Papillitis
 - (4) Ischemic optic neuropathy
 - b. Amaurosis fugax
 - c. Optic atrophy
 - d. Visual field defect
4. Glossary
 - a. Scotoma
 - b. Hemianopia
 - c. Homonymous hemianopia
 - d. Bi-temporal hemianopia

Competencies:

- Student should
 - o Measure visual acuity with near card
 - o Perform confrontation visual field testing in four quadrants in each eye
 - o Test pupillary function and be able to recognize afferent pupillary defect
 - o Perform ductions and versions and recognize cranial nerve palsies III, IV, VI
 - o Recognize and diagnose Nystagmus
 - o Exam the optic disc with the direct ophthalmoscope and recognize optic nerve pallor and papilloedema

5. RETINA VITREOUS

I. SYMPTOMS SUGGESTIVE OF VITREORETINAL DISORDERS

- a. Flashes
- b. Floaters
- c. Central blur and/or distortion and/or minification
- d. Abrupt or progressive dimming of vision in one eye
- e. Abrupt or progressive loss of peripheral visual field in one eye

II. ANATOMY OF VITREOUS AND RETINA

- a. Clarity of vitreous
- b. Transparency of retina and normal retinal blood vessel walls
- c. Location of rods and cones in retina relative to vitreous and choroid
- d. Nature of retinal pigment epithelium
- e. Nature of choroid

III. EXAMINATION OF THE EYE BY DIRECT OPHTHALMOSCOPY

- a. Evaluation of red reflex
- b. Examination of optic disc
- c. Examination of retinal blood vessels on and adjacent to optic disc
- d. Examination of posterior retina and choroid

IV. NORMAL FUNDUS FEATURES BY DIRECT OPHTHALMOSCOPY

- a. Appearance of normal red reflex
- b. Appearance of normal optic disc
- c. Appearance of normal retinal arteries and veins
- d. Appearance of normal posterior retina and choroid

V. ABNORMAL FUNDUS FEATURES BY DIRECT OPHTHALMOSCOPY

1. General

- a. Loss of normal red reflex
- b. Dark spots in red reflex
- c. Abnormal color of red reflex

2. Fundus features of important systemic diseases

- a. Diabetes mellitus
 - Background diabetic retinopathy
 - Proliferative diabetic retinopathy
 - Sickle Cell Retinopathy
- b. Systemic hypertension
 - Vasospastic (accelerated) retinopathy
 - Sclerotic (chronic) retinopathy
- c. Atherosclerotic carotid occlusive disease
 - Central retinal artery occlusion
 - Central retinal vein occlusion

- Embolic cardiovascular disease
- d. AIDS
- e. Disseminated metastatic cancer
- 3. Fundus features of important ocular diseases
 - Retinoblastoma
 - Retinal detachment
 - Age-related macular degeneration

VI. WHEN TO REFER PATIENT TO AN OPHTHALMOLOGIST

1. Whenever there is no improvement in Visual Acuity with pinhole in the presence of a normal looking anterior segment.
2. Whenever examination reveals abnormal features of red reflex or fundus
3. Whenever patient reports visual loss or symptoms consistent with a vitreoretinal disorder

Competencies:

- Student should
 - o Understand anatomy and function of retina
 - o Understand definition and function of the macula
 - o Recognize normal retinal vasculature
 - o Detect diabetic retinopathy, background and proliferative
 - o Detect Sickle Cell Retinopathy
 - o Understand definition and treatment of retinal detachment
 - o Understand importance of retinoblastoma and recognize leukocoria
 - o Understand importance of choroidal malignant melanoma – definition and prevalence
 - o Understand importance of dilated fundus exam
 - o Recognize a change in red reflex

6. LENS & CATARACT

I. ANATOMY OF LENS

- a. Intraocular location of lens behind plane of iris
- b. Optical clarity of normal lens
- c. Suspension of normal lens in retroiridic position by zonule

II. SYMPTOMS ATTRIBUTABLE TO CATARACT

- a. Slowly progressive blurring of vision
- b. Progressive painless loss of vision

III. EXAMINATION OF THE LENS BY DIRECT OPHTHALMOSCOPY

- a. Evaluation of red reflex

IV. ABNORMAL LENS FEATURES BY DIRECT OPHTHALMOSCOPY

1. General
 - a. Loss of normal red reflex
 - b. Dark spots in red reflex
 - c. Abnormal color of red reflex
2. Lens abnormalities found in important systemic diseases
 - a. Marfan's syndrome – spontaneous dislocation of lens
3. Lens abnormalities found in important ocular diseases
 - a. Cataract (clouding or opacification of lens)
 - b. Implanted artificial intraocular lens

V. TREATMENT OF CATARACT

- a. Surgical removal of lens (cataract extraction)
- b. Implantation of artificial lens in eye

VI. WHEN TO REFER PATIENT TO AN OPHTHALMOLOGIST

- a. Examination reveals abnormal red reflex or lens clouding or opacity
- b. Patient reports progressive visual loss or blurring

Competencies:

- Student should
 - o Understand the anatomy of lens
 - o Describe presbyopia – definition and symptoms
 - o Diagnose cataract
 - definition and symptoms
 - red reflex
 - slit lamp findings
 - o Understand important of lens dislocation
 - o Describe management of cataract
 - surgery
 - intraocular lens

7. Eyelid, Lacrimal and Orbit

I. Eyelid

A. Examination and Technique

- a. Assess the position of the upper eyelid by measuring the distance between the lid margin and the corneal light reflex
- b. Visual inspection of eyelids and periocular area

B. Anatomy

- a. Anterior and posterior lamellae
- b. Lid margin
- c. Orbital septum relationship to eyelid/orbit
- d. Eyebrow
- e. Levator aponeurosis
- f. Blood supply – internal and external carotid circulation
- g. Sensory supply – V1 and V2
- h. Motor supply – CN III, CN VII, and sympathetics

C. Eyelid Diseases

1. Malpositions

- a. Blepharoptosis
- b. Dermatochalasis
- c. Entropion
- d. Ectropion
- e. Retraction
- f. Lagophthalmos

2. Inflammations and Infections

- a. Chalazion
- b. Blepharitis
- c. Meibomitis
- d. Hordeolum
- e. Preseptal cellulites

3. Tumours

- a. Benign

1. Cysts
2. Nevi
3. Papillomas
4. Xanthelesma
- b. Malignant
 1. Squamous cell carcinoma
 2. Basal cell carcinoma
4. Eyelid trauma

II. Lacrimal

- A. Examination technique
 1. Visual inspection of medial canthal area
- B. Anatomy
 1. Upper lacrimal system – puncta, canaliculi and lac sac
 2. Lower lacrimal system – bony and mucosal nasolacrimal duct
- C. Lacrimal Diseases
 1. Congenital nasolacrimal duct obstruction
 2. Acquired nasolacrimal duct obstruction
 3. Dacryocystitis
 4. Lacrimal Trauma

III. Orbit

- A. Examination technique
 1. Use visual techniques to identify axial and non-axial proptosis*
 2. Be familiar with exophthalmometer
- B. Anatomy
 1. Seven bones comprise 4 walls – floor, medial and lateral
 2. Orbital septum relationship to orbit**
 3. Contents of orbit – extraocular muscles, lacrimal system, ophthalmic artery, nerves (CN II, IV, V, VI, sympathetics, and parasympathetics)
 4. Relationship of orbit to surrounding structures – sinuses, cranial cavity
- C. Orbital Diseases
 1. Orbital cellulitis
 2. Graves' ophthalmopathy
 3. Orbital inflammatory disease
 4. Orbital tumors – vascular, nerve sheath, metastatic and lacrimal tumors
 5. Orbital trauma

Competencies:

- Student should
 - o Understand basic structure and function of eyelids, and common malpositions, and acquired disorders.
 - o Understand tear production and drainage.
 - o Understand orbital structure and common abnormalities.

8. Refractive Surgery

I. Types of refractive errors:

- a. Myopia – long eye or steep cornea
- b. Hyperopia – short eye or flat cornea
- c. Astigmatism – uneven curvature of cornea
- d. Presbyopia – inability to focus at near due to aging

II. Types of surgical techniques to correct refractive errors.

- a. Incisional – weaken cornea structurally to induce changes in its curvature
- b. Lamellar – change shape of the cornea with addition or removal of tissue
- c. Thermal – shrink corneal collagen to induce corneal steepening
- d. Intraocular – implantation of intraocular lens or removal of crystalline lens

III Effectiveness of refractive surgery:

- a. Continues to improve
- b. Newer techniques such as Lasik are more predictable than older techniques such as RK
- c. Uncorrected visual acuity of 20/40 or better is achieved in 95% of
- d. Range of treatable refractive errors is expanding

IV Risks associated with refractive surgery include:

- a. Infection
- b. Loss of best-corrected visual acuity
- c. Overcorrection, undercorrection, regression
- d. Visual Aberrations such as glare and haloes

Competencies:

- Student should
 - o Understand refractive errors and their relations to eye length, corneal curvature, and lens status.
 - o Describe refractive surgical theory and practice.
 - o Understand risks and benefits of commonly discussed and performed refractive procedures

9. Ocular Manifestations of Systemic Disease

I. Diabetes

A. Anterior segment

1. corneal wound healing
2. cataract

B. Posterior segment

1. diabetic retinopathy
 - a. background retinopathy-hard exudates, hemorrhages, microaneurysms
 - b. proliferative retinopathy-soft exudates, intraretinal microvascular abnormality
 - c. proliferative retinopathy – neovascularization of the disc, neovascularization elsewhere
2. vitreous hemorrhage
3. ischemic optic neuropathy

II. Sickle cell anemia

A. Anterior segment

1. most common cause of sudden painless loss of vision in a young adult
2. importance of recognizing traumatic hyphema
3. anterior segment ischemia

B. Posterior segment

1. salmon patch
2. black sunburst

3. sea fan

III. Hypertension

A. Posterior segment

1. arteriolar narrowing
 - a. copper wire
 - b. silver wire
2. hemorrhages (flame-shaped)
3. exudates (cotton wool spots, macular star)
4. disc edema (malignant hypertension)

B. Neuro-ophthalmic manifestations

1. Cranial nerve palsy
2. intracranial hemorrhage

IV. Cerebrovascular diseases

A. Transitory Ischemia Attack (TIA)

1. visual changes
2. fundus findings

B. Infarction

1. history
2. visual field findings
 - a. homonymous hemianopia
 - b. homonymous quadrantanopia

V. Thyroid (Graves) disease

A. Clinical (Werner classification)

B. Treatment for thyroid orbitopathy

1. non-surgical
 - a. corticosteroids
 - b. radiation
2. surgical
 - a. eyelid
 - b. orbital decompression

VI. Sarcoidosis/inflammatory conditions

A. Clinical

1. nodules
 - a. eyelid
 - b. conjunctival
2. uveitis
 - a. non-granulomatous
(associated diseases-JRA, Reiter, Behcet)
 - b. granulomatous
(associated diseases-sarcoid, Tb, fungal)

B. Diagnostic tests

1. Imaging, gallium scan
2. ACE level

VII. Malignancy

A. Primary

1. intraocular
 - a. retinoblastoma
 - b. uveal malignant melanoma
 - c. lymphoma
2. eyelid
 - a. basal cell carcinoma
 - b. sebaceous carcinoma
 - c. melanoma
3. orbit
 - a. lymphoma
 - b. lacrimal gland tumors
 - c. other

B. Secondary

1. extension from sinus carcinoma
2. metastasis
 - a. adults-carcinoma
 - b. children-leukemia

VIII. AIDS

A. Anterior segment

1. bacterial infections of the lids and adnexa
2. Kaposi sarcoma
(conjunctiva or eyelid)
3. Conjunctival tumors

B. Posterior segment

1. CMV retinitis

IX. Syphilis

A. Anterior segment

1. interstitial keratitis
2. anterior uveitis

B. Posterior segment

1. neuroretinitis
2. papillitis
3. posterior uveitis

X Other systemic infections.

A. Viral (e.g. herpes zoster ophthalmicus “shingles”)

B. Fungal (e.g. candida endophthalmitis)

C. Bacterial (e.g. Tb uveitis)

D. Toxoplasmosis

E. Onchocerciasis

Competencies:

- Student should
 - o Recognize retinal exudates and hemorrhages on dilated fundus exam

- o Detect hyphema on slit lamp exam
- o Recognize retinal arteriolar narrowing (copper wire/silver wire) on dilated fundus exam
- o Detect disc edema on fundus exam with direct ophthalmoscopy
- o Perform neurologic assessment of all cranial nerves
- o Perform confrontational visual fields with recognition of hemianopias
- o Recognize limited ocular motility
- o Recognize proptosis
- o Recognize photophobia as symptom of uveitis
- o Assess for malignant neoplasms of eyelids (carcinoma, melanoma)

10. Intraocular Tumors

I. Retinoblastoma

A. Knudson's two-hit hypothesis

B. Genetics

1. 13q14 deletion
2. heritable vs sporadic

C. Clinical

1. leukokoria
2. strabismus

D. Treatment

1. non-surgical
2. surgical (enucleation)

E. Differential diagnosis

1. ROP
2. Coats' disease
3. PHPV

II. Uveal Melanoma

A. Most common primary Intraocular malignancy

B. Variants

1. iris
2. ciliary body
3. choroidal

C. Clinical

1. asymptomatic vs symptomatic
2. pigmented vs amelanotic
3. prognosis
 - a. size
 - b. cell type

D. Treatment

1. non-surgical
2. surgical (enucleation)

E. Differential diagnosis

1. naevus
2. metastasis to eye
3. retinal detachment

III. Other Intraocular Tumors

A. Lymphoma-primary large cell lymphoma vs manifestations of systemic lymphoma

B. Metastasis-carcinomas in adults vs leukemia in children

Competencies:

- Student should
 - o Assess for red reflex with flashlight/penlight
 - o Assess for strabismus with Hirshberg test.
 - o Obtain history to determine for risk factors for retinoblastoma
 - o Detect retinal detachment/intraocular tumor on fundus exam of adult

11. Cornea and External Disease

I. Anatomy

A. Lids

1. Glands of Zeis and Moll
2. Lashes
3. Meibomian glands
4. Lacrimal gland

B. Conjunctiva

1. Bulbar
2. Palpaebal

C. Regional lymph nodes

1. Pre-auricular
2. Sub-mandibular

D. Cornea

1. Tear film layer
2. Epithelium
3. Stroma
4. Endothelium

E. Lacrimal system

1. Punctum – upper and lower
2. Lacrimal sac

II The red eye

A. Acute angle closure glaucoma

B. Iritis or iridocyclitis

C. Herpes simplex keratitis

D. Acute Conjunctivitis

1. Bacterial
2. Viral
3. Allergic
4. Toxic

E. Episcleritis

F. Scleritis

G. Adnexal disease

1. Blepharitis
2. Thyroid eye disease
3. Dacryocystitis
4. Hordeolum
5. Chalazion

H. Subconjunctival hemorrhage versus hyphaema

I. Pterygium

J. Keratoconjunctivitis sicca

K. Corneal abrasions and foreign body

L. Secondary to abnormal lid function

1. Bell's palsy
2. Thyroid ophthalmopathy

III. Symptoms associated with a red eye

A. Blurred vision

B. Photophobia

C. Colored Haloes

D. Discharge

E. Itching

IV. Steps to differentiate the red eye and how to interpret findings

A. Measure central acuity (understand importance of reduced visual acuity)

B. Determine location of redness

1. Subconjunctival hemorrhage
2. Conjunctival hyperemia (epibulbar, palpebral or both)
3. Ciliary flush associated with corneal inflammation, iritis, acute glaucoma#

C. Assess discharge and characterize

1. Profuse or scant
2. Purulent, mucopurulent, or serous

D. Assess for corneal opacity associated with edema, inflammation, ulcer

E. Examine for corneal epithelial defect with fluorescein

F. Estimate anterior chamber depth associated with acute angle closure glaucoma

G. Examine pupils importance with iritis, acute angle closure glaucoma

H. Measure intraocular pressure if elevation suspected

I. Detect presence of

1. Proptosis associated with orbital mass
2. Lid malfunction
3. Limitation of eye movement
4. Pre-auricular lymph-node enlargement

Competencies:

- Student should
 - o Measure central acuity with near card
 - o Assess corneal clarity with penlight
 - o Assess anterior chamber depth and narrowness of angle
 - o Assess pupil size, shape, regularity, and reactivity
 - o Determine if redness is associated with subconjunctival hemorrhage, ciliary flush, or conjunctival hyperemia
 - o Assess conjunctival discharge
 - o Determine if proptosis is present

- o Assess ocular motility
- o Understand findings that are associated serious ocular conditions that require immediate ophthalmologic care

12. Glaucoma

1. Anatomy
 - A. Aqueous humor
 1. Production
 - a. Ciliary body
 2. Circulation
 - a. From posterior chamber through pupil into anterior chamber
 3. Outflow Pathway
 - a. Trabecular meshwork in anterior chamber angle
 - B. Optic Nerve
 1. “Glaucoma” as a chronic progressive optic neuropathy usually associated with increased intraocular pressure
 - a. Injury to axons from retinal ganglion cells at lamina cribrosa
 - b. Signs of optic nerve injury
 - (1) Increased size of central cup
 - (2) Asymmetric cupping
 - C. Organization of axons and associated visual field defects
- II. How to examine the patient
 - A. Central visual acuity measurement
 - B. Visual field testing
 1. Confrontation testing in 4 quadrants in each eye
 2. Central color testing – red top bottle
 - C. Pupillary reaction
 1. Relative afferent pupillary defect as sign of unilateral optic nerve injury
 - D. Penlight examination
 1. Anterior chamber depth estimation
 - a. Normal
 - b. Narrow
 - E. Intraocular pressure
 1. Applanation tonometry
 2. Normal value range
 - F. Direct ophthalmoscopy
- III. How to interpret history
 - A. Primary open angle glaucoma
 1. Risk factors
 - a. African and Caribbean African ancestry
 - b. Age greater than 75 years
 - c. Primary family member with glaucoma
 2. Genetic influence
 - a. GLC1a (myocillin gene) juvenile open angle glaucoma
 3. Symptoms
 - b. Lack of symptoms until late in disease
 - B. Normal tension glaucoma
 1. Optic nerve injury and visual field loss similar to primary open angle glaucoma
 2. Not associated with elevated intraocular pressure
 - C. Primary Angle Closure Glaucoma

1. Risk Factors
 - a. Anatomically narrow anterior chamber angle
 - b. Hyperopia
 - c. Dilating drops in eyes with narrow angles
 - d. Anti-cholinergic medications
 2. Symptoms
 - a. Ocular pain (may be severe)
 - b. Ocular redness
 - c. Blurred vision and colored haloes; nausea
 3. Signs
 - a. Dilated fixed pupil
 - b. Narrow anterior chamber angle
 - c. Pupillary block
 - d. Corneal edema
- IV. Pharmacological treatment for open angle glaucoma
- A. Medications that increase aqueous humor outflow
 1. Parasympathomimetics
 2. Prostaglandin analogues
 - B. Medications that decrease aqueous production
 1. Beta blockers
 2. Carbonic anhydrase inhibitors
 3. Alpha2-agonists
- V. Surgical treatment
- A. Primary acute angle closure glaucoma
 1. Peripheral iridectomy
 - B. Primary open angle glaucoma
 1. Argon laser trabeculoplasty
 2. Filtering surgery

Competencies:

- Student should
 - o Measure visual acuity with near card
 - o Perform confrontation visual field testing in four quadrants in each eye
 - o Assess pupillary reaction for relative afferent pupillary defect
 - o Estimate anterior chamber depth with penlight to determine angle
 - o Diagnose primary acute angle closure glaucoma by history and
 - o Recognize signs of optic nerve injury – increased cupping and
 - o Obtain history to determine risk factors for primary open angle
 - o Estimate the anterior chamber depth penlight to determine angle width
 - o Diagnose primary angle closure glaucoma by history and penlight examination
 - o Recognize signs of optic nerve damage – increased cupping and asymmetric cupping
 - o Obtain history to determine risk factors glaucoma for primary open angle glaucoma

APPENDIX II

Useful Organization Websites

- A. Must for Ophthalmologists and trainees
1. International Council of Ophthalmology – www.icoph.org
Has links for Basic and Clinical Assessments, i.e. testing and examinations; email address: assess@icoph.org
 2. Ophthalmological Society of Nigeria – www.osn.org.ng
 3. National Eye Institute (NEI) - www.nei.nih.gov.
 4. International Agency For the Prevention of Blindness (IAPB) www.iapb.org
- B. Others
1. American Academy of Ophthalmology - www.aao.org; and www.aao.org/education/index.cfm
 2. American Board of Ophthalmology – www.abop.org
 3. Atlas of Ophthalmology - www.atlasophthalmology.com
 4. Digital Journal of Ophthalmology – www.djo.harvard.edu
 5. Diabetic Retinopathy Images - www.eyesearch.com/diabetic/retinopathy.images.htm
 6. EyeAtlas - Online Atlas of Ophthalmology – www.eyeatlas.com
 7. Eye Cancer Network – <http://eyecancer.com>
 8. EyeLibrary.Org – <http://www.eyelibrary.org>
 9. Eye Text.Net – <http://www.eyetext.net>
 10. Graduate medical education – www.acgme.org
 11. Images of eye diseases – www.redatlas.org
 12. Multiple ophthalmic listings – google.com (type in --, i.e. search for ---“eye resources on the internet”). For example, www.webeye.ophth.uiowa.edu/dept/websites/eyeres.htm
 13. New York Eye & Ear Infirmary: Digital Atlas of Ophthalmology – www.nyee.edu/page_deliv.html?page_no=50
 14. Royal College of Ophthalmologists – www.rcophth.ac.uk/education/index.htm
 15. Royal Australian and New Zealand College of Ophthalmology – www.ranzco.edu
 16. Wilmer Ophthalmological Institute – www.wilmereveinstitute.net
 17. Association for Research and Vision in Ophthalmology (ARVO).

Selected Ophthalmology journal websites

1. Acta Ophthalmologica Scandinavica --www.blackwellpublishing.com/journals/aos
2. Nigerian Journal of Ophthalmology
American Journal of Ophthalmology
Ophthalmology
Ophthalmology clinics of North America
Survey of ophthalmology
Several sub-specialty titles - www.ophsource.org
3. Archives of Ophthalmology --www.archophthalmol.com
4. British Journal of Ophthalmology --www.bjophthalmol.com
5. Canadian Journal of Ophthalmology --www.eyesite.ca
6. Clinical and Experimental Ophthalmology -www.blackwellpublishing.com/journals/ceo
7. Community Eye Health – www.jceh.co.uk
8. Current Opinion in Ophthalmology--www.co-ophthalmology.com
9. European Journal of Ophthalmology --www.eur-j-ophthalmol.com/ejo/
10. Eye --www.nature.com/eye/

11. Graefes Archive for Clinical and Experimental Ophthalmology -www.springerlink.com
12. International Ophthalmology Clinics --www.internat-ophthalmology.com
13. Investigative Ophthalmology and Visual Science --www.iovs.org
14. Japanese Journal of Ophthalmology (new publisher as of 2004) --www.springer-tokyo.jp.co
15. Ophthalmologica--www.karger.com
16. Transactions of the American Ophthalmological Society --www.aonline.org
17. Lippincott Williams and Wilkins --www.lwwonline.com
(Individual users only)
Current Opinion in Ophthalmology
International Ophthalmology Clinics
Cornea
Evidence-Based Eye Care
Eye and Contact Lens
Journal of Glaucoma
Journal of Neuro-ophthalmology
Ophthalmic Plastic and Reconstructive Surgery
Optometry and Vision Science
Retina
Techniques in Ophthalmology

APPENDIX III

A. OPHTHALMOLOGIST CONTINUING PROFESSIONAL EDUCATION

CURRENT SITUATION-OBSERVATIONS:

There is no effective continuing medical education. As of now, there are no sanctions for non-compliance. Previous decisions taken on this lacked follow-up and so nothing has come out of it. Attendance at conferences by fellows is very poor – only the same group are seen at every meeting. Some of the reasons suggested for this situation include:

- Apathy
- Wrong orientation during residency training
- Lack of awareness
- Finance

How useful are the non-ophthalmology congresses to the ophthalmologists?

e.g. The Nigerian Medical Association (NMA) meetings , West African College of Surgeons meetings etc?

RECOMMENDATIONS:

*The decisions taken on the Continuing Medical Education programme two years ago should be implemented.

***CONTINUING MEDICAL EDUCATION (CME)**

PROVIDERS & ASSESSORS

For Continuing Medical Education programmes, it is only appropriate that there must be accredited PROVIDERS so that the programmes and the credits allocated to them could be standardized.

Consequently, there are two facets to the provision of CME programmes

Providers

Assessors

PROVIDERS

Basically, any qualified doctor or institution can be a CME provider. However, the Teaching and Specialist Hospitals are traditionally known for the dissemination of knowledge and skills within the medical profession. Certain medical organisations also have CME programmes for their members. For example, Nigerian Medical Association (NMA), Association of General and Private Medical Practitioners of Nigeria (AGMPN) and the OSN.

CME programmes are not limited to Teaching Hospitals and Medical Societies. Some private hospitals also provide opportunity for the dissemination of knowledge. However, it is essential that all PROVIDERS have their courses examined and assessed as to the aims and objectives, content, relevance and quality using laid down criteria. This process of Assessment of courses and programmes is known as ACCREDITATION. In order to have a successful programme there must be an Accreditation Boards and reputable assessors who are ready to work very hard with little or no remuneration.

A. ACCREDITATION BOARD FOR CME.

The Board should be established by the OSN and its function will be among others:

1. Establishment of rules and guidelines for assessment and accreditation of courses to determine their relevance and acceptability.
2. Determination of the criteria for allocation of credit units for accepted courses.
3. Appointment of assessors from available personnel who will perform the task of accrediting courses and programs and allocating credit units as per laid down guidelines.
4. Act as a central clearing house and registry for issuance of certification and registration of the CME credits obtained.
5. Serve as the police of the CME, investigate and advise as to any breaches.

MEMBERS OF THE ACCREDITATION BOARD FOR CME

It is suggested that there should be a minimum of three members and a maximum of five. The members must meet the following criteria:

- Must have spent a minimum of 10 years in the profession of Ophthalmology.
- Must be persons of proven integrity and character.
- Must show evidence of continuing medical education by
 - a) Meeting the minimum CME credit requirements prescribed by the Board itself
 - b) Attendance at local and or international conferences at least once in two years.
- Must have published at least two papers in reputable journals in the preceding two years . prior to his appointment.

- Must be accessible on telephone and have easy access to the internet because most of the work, meetings and communications will be done on line.

THE ASSESSOR

- Must have spent a minimum of five years in the profession of Ophthalmology.
- Must be persons of proven integrity and character.
- Must show evidence of continuing medical education as stated above.
- Must be accessible on telephone and have easy access to the internet where most of the work will be done.

The duty of the assessor is be to vet the CME programmes submitted by the intending providers using criteria laid down by the BOARD FOR CME.

Assessors must be well distributed over the country for ease of accessibility.

ASSESSMENT OF CONTINUING MEDICAL EDUCATION

Group A: Teaching -----60 Units

Undergraduate teaching

Acting as resource person (update courses, workshops)

Post graduate doctors teaching

As examiner in post graduate exams

Group B: Research, audit and their products -----60 Units

Presentations

Journal or book presentations

Supervision of postgraduate research work

Group c: Scientific Meetings -----60 Units

National Scientific Meetings e.g. OSN

International Scientific Meetings e.g. WACS, AAO, IAPB, PAACO

Local Scientific Meetings e.g. Zonal OSN

Group D: Workshops and Courses -----60 Units

Minimum compulsory number of units per year -----100 CME units (Consultants)

80 CME Units (Diplomates)

These credit units must be obtained from at least 2 groups above.

The resource centres in various centres should be fully utilised;

While the non-core ophthalmologists' congresses in themselves are all right, the ophthalmologists should improve and increase their participation in the non-core ophthalmologists' annual congresses e.g. presenting papers in parallel sessions, making our presence felt etc. in NMA, WACS etc.

To increase ophthalmologists' interest in these conferences, some severe measures like *sanctions may have to be imposed.*

APPENDIX IV

International Council of Ophthalmology (ICO)
International Task Force on Resident and Specialists Training
GUIDELINES FOR EDUCATION OF THE OPHTHALMIC SPECIALIST AND SUBSPECIALIST
Andrew G. Lee, MD, and Morton F. Goldberg, MD
On Behalf of the ICO

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	The Glaucoma Laser Trial (GLT)
	The Optic Neuritis Treatment Trial (ONTT)
	The Ischemic Optic Neuropathy Decompression Trial (IONDT)
	Studies of the Ocular Complications of AIDS (SOCA)
	Branch Vein Occlusion Studies (BVOS)
	Macular Photocoagulation Study (MPS)
	Age-Related Eye Disease Study (AREDS)
	Verteporfin in Photodynamic Therapy (VIP) Study
	Treatment of Age-Related Macular Degeneration with Photodynamic Therapy (TAP)
	Silicone (oil) Study
	The Submacular Surgery Trials (SST)
	The Multicenter Trial of Cryotherapy for Retinopathy of Prematurity (CRYO-ROP)
	Central Vein Occlusion Studies (CVOS)
	Diabetes Control and Complications Trial (DCCT)
	Diabetic Retinopathy Study (DRS)
	Early Treatment Diabetic Retinopathy Study (ETDRS)
	Randomized Trial of Acetazolamide for Uveitis-Associated Cystoid Macular Edema
	Collaborative Ocular Melanoma Study (COMS)
	Selected Review Articles

OPHTHALMOLOGY CURRICULUM

DIDACTIC AND SKILLS TRANSFER MANUAL

Purpose: To describe a broad-based curriculum for basic, standard, and advanced levels of ophthalmic training.

Methods: An international request for existing residency and training curricula in ophthalmology was made to members of the International Council of Ophthalmology in multiple countries. A systematic review was performed of the available curricular materials, and a set of learning objectives was created, based upon the review. A systematic review and revision of the draft curriculum were performed by experts from several countries

Results: An ophthalmology curriculum was developed based upon levels of training (basic, standard, and advanced). The following curricula and content outlines were reviewed:

- American (USA) Board of Ophthalmology website: www.abop.org; European Board of Ophthalmology website www.ebo-online.org; British
- Residency curriculum of Baylor College of Medicine (Residency Progress Notebook), Houston, Texas, USA
- Basic and Clinical Science Series. American Academy of Ophthalmology, San Francisco, CA., USA
- Residency curriculum of the Association of University Professors of Ophthalmology (AUPO), USA
- Fundamental Standards of the Royal Australian and New Zealand College of Ophthalmologists
- Training curricula of Poland and Slovenia, Estonia, Lithuania, Slovakia, Russia, Bulgaria, Belarus, India, United Kingdom, Australia and New Zealand.
- Global Initiative for the Elimination of Avoidable Blindness (Vision 2020-The Right to Sight). www.who.int/pbd/vision2020.
- Lions Sightfirst Eye Hospital Training Programme for cataract surgeons, Lilongwe Central Hospital, Malawi.
- Curriculum for advanced diploma in surgical ophthalmic nursing and for post-basic and community ophthalmic nursing programme in West Africa.
- Report of the Workshop on “Vision 2020” and undergraduate medical education in West Africa (including Gambia, Ghana, and Nigeria).
- Reports to the International Council of Ophthalmology regarding training requirements summary of South Africa, Australia, Portugal, Asia-Pacific Rim.

Conclusion: A curriculum for ophthalmic training stratified by level of expertise may be helpful in the education of ophthalmic specialists (e.g., “residents, house officers, trainees”).

Key to levels of training

- Basic level =(Corresponding to United States Post-Graduate Year [PGY]-2)*
- Standard level = (Corresponding to US Post-Graduate Year [PGY-3])
- Advanced level (Corresponding to US Post-Graduate Year [PGY-4])

*In the United States, the post-graduate year 1 (after medical school) is a one year general training year (i.e., “internship”, “preliminary medicine, surgery, transitional year,” etc.).

CHAPTER 1. INTRODUCTION

The suggested curriculum in all chapters is designed to serve as a content outline for a fund of knowledge. The learning objectives are designed to emphasize recall of information (fund of knowledge), understanding and application of basic sciences (e.g., anatomy, physiology, biochemistry, embryology, pharmacology), application of 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. This curriculum is not designed to be all inclusive, and individual programs should modify and apply the content as deemed appropriate to meet local, regional, and national priorities. It is intended solely as a guideline for the training of ophthalmic specialists. We recognize that certain specialized and expensive techniques of diagnosis and therapy are not universally available. All of the goals cannot invariably be achieved, but they should serve as aspirational guidelines towards achieving modern methods of diagnosis and care of common eye problems. It should be noted that parenthetical listings preceded by “e.g.” represent examples only, and do not comprise a complete listing of items in the category.

BASIC LEVEL GOALS: PGY-2

- A. To describe the basic principles of optics and refraction.
- B. To list the indications for and to prescribe the most common low vision aids.
- C. To perform the basic anterior segment (e.g., basic refraction, basic retinoscopy, slit lamp biomicroscopy) and posterior segment examination skills (e.g., dilated fundus examination, use of magnification and lenses, Hruby lens, 90 Diopter lens, three mirror Goldmann contact lens) and to understand and use basic ophthalmic instruments (e.g., tonometer, lensometer).
- D. To triage and manage ocular emergencies (e.g., central retinal artery occlusion, giant cell arteritis, chemical burn, acute angle closure glaucoma, endophthalmitis, traumatically open globe).
- E. To perform minor external and adnexal surgical procedures (e.g., chalazion excision, corneal foreign body removal, use of foreign body corneal drill for removal of a rust ring, conjunctival biopsy, corneal scraping).
- F. To identify the key examination techniques and management of basic and most common medical problems in the subspecialty areas of glaucoma (e.g., primary open angle glaucoma), cornea (e.g., dry eye, microbial keratitis), orbit and oculoplastics (e.g., common lid lesions, ptosis), retina (e.g., macular disorders, retinal detachment, diabetic retinopathy), and neuro-ophthalmology (e.g., optic neuropathy, ocular motor neuropathy, pupillary abnormalities, visual field defects).
- G. To describe indications for, performance of, and complications of common anterior segment surgery, (e.g., cataract extraction, trabeculectomy, peripheral iridectomy).
- H. To describe the common but serious genetic ocular disorders (e.g., retinal and macular dystrophies).
- I. To recognize the most common ophthalmic histopathology findings and to recognize basic histopathology of common ocular lesions (e.g., retinal detachment, pterygium, corneal button removed at keratoplasty).

STANDARD LEVEL GOALS: PGY-3 (In addition to Basic Level goals)

- A. To describe the more advanced principles of optics and refraction.
- B. To list the indications for and uses of more advanced low vision aids.

- C. To perform more advanced anterior segment (e.g., more complex refractions, including contact lens and post-operative refractions, intermediate retinoscopy, including moderate astigmatism, examination of young children, intermediate techniques of slit lamp biomicroscopy) and posterior segment examination skills (e.g., more advanced techniques of dilated fundus examination, including scleral depression, use of magnification and lenses to diagram and describe retinal lesions).
- D. To recognize and treat ocular emergencies (e.g, central retinal artery occlusion, giant cell arteritis, chemical burn, acute angle closure glaucoma, endophthalmitis, traumatically open globe), as well as the short and long term complications of these disorders.
- E. To perform more advanced external and adnexal surgical procedures (e.g., simple ectropion and simple entropion repair, removal of small, localized, and benign lid lesions, pterygium excision).
- F. To identify the key examination techniques and management of the less common surgical problems in the subspecialty areas of glaucoma (e.g., secondary open angle and closed angle glaucoma), cornea (e.g., fungal and other less common microbial keratitis, corneal transplantation), ophthalmic plastic surgery (e.g., extensive benign and common lid lesions, ptosis), retina (e.g., simple retinal detachment, mild to moderate proliferative and non-proliferative diabetic retinopathy and laser treatments), and neuro-ophthalmology (e.g., less common optic neuropathy, supranuclear palsies, myasthenia gravis, more complex visual field defects).
- G. To perform common anterior segment surgery (e.g., cataract extraction, trabeculectomy, peripheral iridectomy).
- H. To recognize, and refer if indicated, some major genetic ocular disorders (e.g., neurofibromatosis I and II, tuberous sclerosis, von Hippel Lindau syndrome, retinoblastoma, retinitis pigmentosa).
- I. To recognize more complex and difficult ophthalmic histopathology findings.

ADVANCED LEVEL GOALS: PGY-4 (In addition to Standard Level goals)

- A. To describe the advanced principles of optics and refraction (e.g., pre- and post-refractive surgery, higher order aberrations).
- B. To list the indications for and uses of advanced low vision aids.
- C. To perform the most advanced anterior segment (e.g., complex refractions, advanced retinoscopy, advanced slit lamp biomicroscopy) and posterior segment examination skills (e.g., drawings of retinal detachments; interpretation of macular disorders with slit lamp biomicroscopy).
- D. To manage or supervise the more junior trainees (e.g., medical students or medical residents) in the management ocular emergencies (e.g, central retinal artery occlusion, giant cell arteritis, chemical burn, angle closure glaucoma, endophthalmitis).
- E. To perform more advanced external and adnexal surgical procedures (e.g., lacrimal gland procedures, complex lid laceration repair, e.g., canalicular and lacrimal apparatus involvement).
- F. To identify the key examination techniques and management of complex but common medical and surgical problems in the subspecialty areas of glaucoma (e.g., complicated or post-operative primary and secondary open and closed angle glaucoma), cornea (e.g., unusual or rare types of microbial keratitis), ophthalmic plastic surgery (e.g., less common and more complex lid lesions, re-operation or complex or recurrent ptosis), retina (e.g., complex retinal detachment, tractional retinal detachments and severe proliferative diabetic retinopathy, proliferative vitreoretinopathy), and neuro- ophthalmology (e.g., unusual optic neuropathy, neuroimaging, supranuclear palsies, uncommon visual field defects).
- G. To perform and treat complications of common anterior segment surgery, (e.g., cataract extraction, trabeculectomy, peripheral iridectomy).
- H. To recognize and evaluate the major genetic ocular disorders (e.g., neurofibromatosis I and II, tuberous sclerosis, von Hippel Lindau syndrome, retinoblastoma, retinitis pigmentosa).

I. To recognize uncommon or rare but classic ophthalmic histopathology findings.

Trainees at all levels of training should be able to describe the key features and apply in clinical practice the results of evidence-based medicine in ophthalmology, including but not limited to the results of the following clinical trials (see Appendix 1 for full references)

The Herpetic Eye Disease Study (HEDS)
The Fluorouracil Filtering Surgery Study (FFSS)
The Normal Tension Glaucoma Study
The Ocular Hypertension Study (OHTS)
The Glaucoma Laser Trial (GLT)
The Optic Neuritis Treatment Trial (ONTT)
The Ischemic Optic Neuropathy Decompression Trial (IONDT)
Studies of the Ocular Complications of AIDS (SOCA)
Branch Vein Occlusion Studies (BVOS)
Macular Photocoagulation Study (MPS)
Age-Related Eye Disease Study (AREDS)
Verteporfin in Photodynamic Therapy (VIP) Study
Treatment of Age-Related Macular Degeneration with Photodynamic Therapy (TAP)
Silicone (oil) Study
The Submacular Surgery Trials (SST)
The Multicenter Trial of Cryotherapy for Retinopathy of Prematurity (CRYO-ROP)
Central Vein Occlusion Studies (CVOS)
Diabetes Control and Complications Trial (DCCT)
Diabetic Retinopathy Study (DRS)
Early Treatment Diabetic Retinopathy Study (ETDRS)
Randomized Trial of Acetazolamide for Uveitis-Associated Cystoid Macular Edema
Collaborative Ocular Melanoma Study (COMS)

CHAPTER 2. OPTICS

BASIC LEVEL GOALS: PGY-2

A. Cognitive skills

1. To describe the basic optics of the human eye (e.g., ametropia, astigmatism, hyperopia, myopia, presbyopia, aniseikonia, anisometropia, aphakia).
2. To describe the importance of pupil size and its effect on optical resolution.
3. To list the various refractive surfaces.
4. To describe the optical parameters affecting retinal image size.
5. To describe a schematic eye and reduced eye.
6. To describe the following terms related to magnification
 - a. Linear
 - b. Angular
 - c. Relative size
 - d. Electronic
7. To describe the following terms related to visual acuity testing
 - a. Distance and near acuity measurement
 - b. Minimal
 - 1) Visible
 - 2) Perceptible
 - 3) Separable
 - 4) Legible
 - c. Vernier acuity
8. To describe, describe the indications for, and interpret basic tests of contrast sensitivity and color vision (e.g., Ishihara color plates, Hardy-Rand-Rittler plates, Farnsworth-Munsell testing)
9. To describe the following terms and the clinical application for each
 - a. Physical optics
 - 1) Properties of light
 - a) Wave theory of light
 - b) Photon-particle theory of light
 - 2) Images
 - 3) Objects as light sources
 - 4) Laws of refraction
 - a) Passage of light from one medium to another
 - b) Absolute index of refraction
 - c) Total reflection
 - b. Vergence of light
 - 1) Diopter
 - 2) Convergence
 - 3) Divergence
 - 4) Vergence formula
 - c. Real/virtual objects and images
 - d. Interference and coherence
 - e. Polarization
 - f. Diffraction/diffusion
 - g. Scattering
 - h. Transmission and absorption
 - i. Illumination
 - j. Pinhole imaging
 - k. Image quality

- l. Brightness and radiance
- m. Light propagation-optical media and refractive index
- n. Ray tracings
- 10. To describe following optical concepts in a clinical context
 - a. Geometrical optics
 - 1) Optical interfaces
 - 2) Objects and images at infinity
 - 3) Refractive index
 - 4) Snell's Law
 - 5) Multiple lens systems
 - b. Mirrors
 - 1) Laws of reflection
 - 2) Critical angle
 - 3) Regular and diffuse reflection
 - 4) Image and field of a plane mirror
 - 5) Focal point and focal length of a spherical mirror
 - 6) Critical angles
 - c. Prisms
 - 1) Types
 - a) Plane
 - b) Parallel
 - c) Plate
 - 2) Refraction of light through a prism
 - 3) Total internal reflection
 - 4) Ophthalmic prisms
 - 5) Thin prisms
 - 6) Prism diopters
 - 7) Minimum deviation
 - 8) Prismatic effect of lenses
 - 9) Prentice rule
 - 10) Fresnel's prisms
 - d. Lenses
 - 1) Diopter
 - 2) Concave and convex
 - 3) Vertex power/lens effectivity
 - 4) Sphero-cylinder lenses and surfaces
 - 5) Cross cylinders
 - 6) Conoid of Sturm
 - 7) Transposition of +cylinder/-cylinder
 - 8) Focal points and focal planes
 - 9) Principal planes and principal points
 - 10) Focal length
 - 11) Reflection and refraction at curved surfaces
 - 12) Image jump and displacement
 - 13) Lens effectivity
 - 14) Simple lens formula
 - e. Lens aberrations
 - 1) Spherical aberration
 - 2) Coma
 - 3) Astigmatism
 - 4) Distortion
 - 5) Aberration
 - 6) Pantoscopic tilt

- f. Lens materials
 - 1) Lens styles/materials
 - 2) Slab off prism
 - 3) Aphakic spectacles
- g. Instruments
 - 1) Lensometer
 - 2) Slit lamp biomicroscope
 - 3) Retinoscope
 - 4) Direct ophthalmoscope
 - 5) Indirect ophthalmoscope
- h. Telescopes
 - 1) Galilean
 - 2) Keplerian
- i. Aniseikonia
 - Knapp's Rule

B. Technical skills

1. To perform a basic refraction of simple refractive error.
2. To perform basic assessment of corneal topography (e.g., Placido disc, keratometry, automated corneal topography).
3. To perform the following basic refractometric techniques.
 - a. Retinoscopy
 - b. Objective and subjective refraction (manifest and cycloplegic refraction and post-cycloplegic refractions)
 - c. Use of cylinders
 - d. Application of cross cylinder technique
 - e. Refining sphere and cylinder
 - f. Duochrome technique
 - g. Binocular balancing
 - h. Presbyopia, measuring for near adds
 - i. Refracting the basic low vision patient
4. To describe and apply in a clinical setting the following basic concepts
 - a. Snell's Law
 - b. Refraction and axial myopia
 - c. Refraction and axial hyperopia
 - d. Cylinder lenses and pinhole
5. *To describe and to apply in a clinical setting the following concepts on accommodation and convergence*
 - a. Amplitude of accommodation
 - b. Near point of accommodation
 - c. Effects of spectacles and contact lenses
 - d. Far point
 - e. Near point

STANDARD LEVEL GOAL: PGY-3

Improve proficiency in Basic Level skills.

ADVANCED LEVEL GOALS: PGY-4 (In addition to Standard and Basic Level goals)

To apply the relevant optics information, above, in the following situations

1. Refraction and prescribing of spectacles and contact lenses
2. Intraocular lens calculation
3. Cataract surgery
4. Use of prisms for diplopia
5. Low vision aid prescribing

CHAPTER 3. RETINOSCOPY AND REFRACTION

Overall goals

1. To identify the principles and indications for retinoscopy.
2. To perform the technique of retinoscopy.
3. To identify media opacities with retinoscopy.
4. To perform an integrated refraction based upon retinoscopic results.

BASIC LEVEL GOALS: PGY-2

1. To describe the major types of refractive errors.
2. To perform elementary refraction techniques (e.g., for myopia, hyperopia, accommodative add).
3. To perform objective and subjective refraction techniques for simple refractive error.
4. To describe basic ophthalmic optics and optical principles of refraction and retinoscopy.
5. To perform retinoscopy for detecting simple refractive errors.
6. To describe the indications for and to use trial lenses or a phoropter for simple refractive error.
7. To describe the basic principles of a keratometer.

STANDARD LEVEL GOALS: PGY-3 (In addition to Basic Level goals)

1. To describe more complex types of refractive errors, including post-operative refractive errors.
2. To perform more advanced refraction techniques (e.g., astigmatism, complex refractions, asymmetric accommodative add).
3. To perform objective and subjective refraction techniques in more complex refractive errors, including astigmatism and post-operative refractive error.
4. To describe the more advanced ophthalmic optics and optical principles of refraction and retinoscopy (e.g., post-keratoplasty, post-cataract extraction).
5. To perform more advanced techniques of retinoscopy for detecting simple and complex refractive error.
6. To describe and use more advanced techniques using trial lenses or the phoropter for more complex refractive errors, including modification and refinement of subjective manifest refractive error and more complex refractive errors (e.g., advanced and irregular astigmatism, vertex distance).
7. To use the keratometer for detection of more advanced refractive error.

ADVANCED LEVEL GOALS: PGY-4 (In addition to Standard Level goals)

1. To describe the most complex types of refractive errors, including post-operative refractive errors, post-keratoplasty, and refractive surgery.
2. To perform the most advanced refraction techniques (e.g., irregular astigmatism, pre- and post-refractive surgery).
3. To perform objective and subjective refraction techniques in the most complex refractive error, including astigmatism and post-operative refractive error.

4. To describe the most advanced ophthalmic optics and optical principles of refraction and retinoscopy, including higher order aberrations.
5. To utilize the most advanced ophthalmic optics and optical principles for refraction and retinoscopy, including higher order aberrations.
7. To perform the most advanced techniques using trial lenses or the phoropter for more complex refractive errors, including modification and refinement of subjective manifest refractive error, cycloplegic retinoscopy and refraction, and post-cycloplegic refraction, irregular astigmatism, post-keratoplasty, and refractive surgery cases.
7. To use the keratometer for detection of subtle or complex advanced refractive error.
8. To use more advanced refraction instruments and techniques (e.g., distometer, automated refractor, corneal topography).

CHAPTER 4. CATARACT AND LENS

General Goals

- A. To describe the indications, evaluation and management, and intra- and post-operative complications of cataract surgery and other anterior segment procedures.
- B. To perform the complete pre-operative ophthalmologic examination of cataract patients.
- C. To formulate the differential diagnoses of cataract and evaluate the normal and abnormal lens.
- D. To perform optimum refraction of the post-cataract surgery patient.
- E. To develop and exercise clinical and ethical decision-making in cataract patients.
- F. To develop good patient communication techniques regarding cataract surgery.
- G. To perform routine and advanced cataract surgery and intraocular lens (IOL) placement.
- H. To manage basic and advanced clinical and surgical cataract problems.
- I. To effectively diagnose and manage intraoperative and post-operative complications of cataract surgery.
- J. To work effectively as a member of the medical care team.
- K. To develop teaching skills about cataracts for training junior trainees and students.

BASIC LEVEL GOALS: PGY-2

A. Cognitive skills

1. *To identify the most common causes and types of cataract (e.g., anterior polar, cortical nuclear sclerotic, posterior subcapsular).*
2. To list the basic history and examination steps for cataract evaluation pre-operatively.
3. To describe the steps in cataract surgical procedures.
4. To define the elementary refraction or contact lens fitting techniques prior to considering cataract extraction to obtain best corrected vision.
5. To describe the major etiologies of dislocated or subluxated lens (e.g., trauma, Marfan's syndrome, homocystinuria, Weill-Marchesani syndrome, syphilis).
6. To be familiar with the techniques of intracapsular cataract extraction, extracapsular cataract extraction, and phacoemulsification.
7. To describe the following:
 - a. Basic ophthalmic optics as related to cataracts
 - b. Types of IOLs
 - c. Types of refractive error in cataract
 - d. Retinoscopy techniques for cataracts
 - e. Subjective refraction techniques for cataract patients
8. To identify and describe the mechanisms of the following instruments in the evaluation of cataracts, including:
 - a. Lensometer
 - b. Autorefractor
 - c. Retinoscope
 - d. Phoropter
 - e. Keratometer
 - f. Slit lamp biomicroscope
 - g. Glare and contrast testing devices
 - h. Potential acuity meter

B. Technical/surgical skills

1. To perform basic slit lamp biomicroscopy, retinoscopy, and ophthalmoscopy.
2. To evaluate and classify common types of lens opacities.
3. To perform subjective refraction techniques and retinoscopy in patients with cataracts.
4. To perform direct and indirect ophthalmoscopy pre- and post-cataract surgery.
5. To perform basic steps of cataract surgery (e.g., incision, wound closure) in the practice lab.
6. To assist at cataract surgery and perform patient preparation, sterile draping, anesthesia.
7. To perform the following steps of cataract surgery in the practice lab or under direct supervision, including any or all of the following:
 - a. Wound construction
 - b. Anterior capsulotomy/capsulorrhexis
 - c. Instillation and removal of viscoelastics
 - d. Extracapsular and phacoemulsification techniques (e.g., sculpting, divide & conquer, phaco-chop)
 - e. Irrigation and aspiration
 - f. IOL implantation (e.g., anterior and posterior)

STANDARD LEVEL GOALS: PGY-3 (in addition to Basic Level goals)

A. Cognitive skills

1. To describe the less common causes of lens abnormalities (e.g., spherophakia, lenticonus, ectopia lentis).
2. To describe the pre-operative evaluation of the cataract patient, including:
 - a. The systemic diseases of interest or relevance to cataract surgery.
 - b. The relationship of external and corneal diseases of relevance to cataracts and cataract surgery (e.g., lid abnormalities, dry eye).
 - c. The relationships of glaucoma and capsular opacities related to cataract surgery
3. To describe glare analysis testing for cataract surgery.
4. To describe the use of A and B scan ultrasonography in cataract surgery.
5. To describe the instruments and techniques of cataract extraction, including extracapsular surgery and phacoemulsification (e.g., trouble-shooting the phacoemulsification machine, altering the machine parameters).
6. To describe the types, indications and techniques for anesthesia for cataract surgery (e.g., topical, local, general).
7. To describe indications, techniques, and complications of surgical procedures, including
 - a. Extracapsular surgery
 - b. Intracapsular surgery
 - c. Phacoemulsification
 - d. Paracentesis
8. To describe the indications for, principles of, and techniques of YAG laser capsulotomy.
9. To describe history and techniques of basic IOL implantation.
10. To correlate the level of visual acuity with the lens opacities.
11. To describe the common complications of cataract and anterior segment surgery (e.g., intraocular pressure elevation, hyphema, endophthalmitis, cystoid macular edema, retinal detachment, intra-ocular lens dislocation, lens-induced glaucoma and uveitis).

B. Technical/surgical skills

1. To perform local injections of corticosteroids, antibiotics, and anesthesia.

2. To implement the basic preparatory procedures for cataract surgery (e.g. obtaining informed consent, identification of instruments, sterile technique, gloving and gowning, prep and drape, other pre-operative preparation).
3. To perform extracapsular surgery in a practice setting (e.g. animal or practice lab) and then in the operating room under supervision, including mastery of the following skills:
 - a. Wound construction
 - b. Anterior capsulotomy/capsulorrhexis
 - c. Instillation and removal of viscoelastics
 - d. Extracapsular technique
 - e. Beginning phacoemulsification-techniques (e.g., sculpting, divide & conquer, phaco-chop)
 - f. Irrigation and aspiration
 - g. IOL implantation (e.g., anterior and posterior, special IOLs)
4. To perform paracentesis of the anterior chamber.
5. To use the operating microscope for basic cataract surgery.
6. In addition to performing the appropriate steps in cataract surgery, to assist in cataract surgery and perform more advanced steps in patient preparation and anesthesia.
7. To describe the more advanced applications of viscoelastics in surgery (e.g., control of iris prolapse, elevation of dropped nucleus, viscodissection).
8. To recognize and refer or treat common post-operative complications of cataract surgery (e.g., endophthalmitis, elevated intraocular pressure, cystoid macular edema, wound leak, uveitis).
9. To perform basic post-operative evaluation of the cataract patient.

ADVANCED LEVEL GOALS: PGY-4 (in addition to Standard Level goals)

A. Cognitive skills

1. To define the more complex indications for cataract surgery (e.g. better view of posterior segment), describe the performance of and describe the complications of more advanced anterior segment surgery (e.g., pseudoexfoliation, small pupils, mature cataract, hard nucleus, black cataract, post-traumatic, zonular dehiscence), including more advanced procedures (e.g., secondary IOLs and indications for specialized IOLs, capsular tension rings, iris hooks, use of green staining).
2. To describe the indications for, techniques of, and complications of cataract extraction in the context of the subspecialty disciplines of glaucoma (e.g., combined cataract and glaucoma procedures, glaucoma in cataractous eyes, cataract surgery in patients with prior glaucoma surgery), retina (e.g., cataract surgery in patients with scleral buckles or prior vitrectomy), cornea (e.g., cataract extraction in patients with corneal opacities), ophthalmic plastic surgery (e.g., ptosis following cataract surgery), and refractive surgery (e.g., cataract surgery in eyes that have undergone refractive surgery).
3. To independently evaluate complications of cataract and IOL implant surgery (e.g., posterior capsular tears, choroidal effusions).
4. To describe the instruments and techniques of cataract extraction including extracapsular surgery and phacoemulsification (e.g., trouble-shooting the phacoemulsification machine, altering the machine parameters).
5. To understand indications for and technique of intracapsular surgery (e.g., rare cases may require this procedure or patients may have had the procedure performed previously).
6. To describe indications for and instrumentation and techniques used to implant foldable and non-foldable IOLs.
7. To describe the evaluation and management of common and uncommon causes of post-operative endophthalmitis.
8. To perform repositioning, removal or exchange of IOLs.

9. To assist in the teaching and supervision of basic and standard level learners (i.e., first and second year residents).
10. To describe the government and hospital regulations that apply to cataract surgery.

B. Technical/surgical skills

1. To describe the indications for, mechanics of, and performance of A scan ultrasonography and calculation of IOL power.
2. To perform phacoemulsification in a practice setting (e.g, animal or practice lab) and then in the operating room, including mastery of the following skills:
 - a. Wound construction
 - b. Anterior capsulotomy/capsulorrhexis
 - c. Viscoelastics
 - d. Intracapsular, extracapsular and phacoemulsification-techniques (e.g., sculpting, divide & conquer, phaco-chop, stop and chop)
 - e. Instrumentation and techniques of irrigation and aspiration
 - f. IOL implantation (e.g., anterior and posterior, special IOLs)
 - g. IOL repositioning, removal or exchange
3. To perform implantation of foldable and non-foldable IOLs.
4. To perform intraoperative and postoperative management of any event that may occur during or as a result of cataract surgery, including:
 - a. Vitreous loss
 - b. Capsular rupture
 - c. Anterior or posterior segment bleeding
 - d. Positive posterior pressure
 - e. Choroidal detachments
 - f. Expulsive hemorrhage
 - g. Elevated intraocular pressure
 - h. Use of topical and systemic medications
 - i. Astigmatism
 - j. Post operative refraction (simple and complex)
 - k. Corneal edema
 - l. Wound dehiscence
 - m. Hyphema
 - n. Residual cortex
 - o. Dropped nucleus
 - p. Uveitis and cystoid macular edema (CME)
 - q. Elevated intraocular pressure and glaucoma

CHAPTER 5. CONTACT LENS

BASIC LEVEL GOALS: PGY-2

A. Objectives

1. To perform a basic contact lens (CL) history and examination, and to be aware of additional basic tests and questions that are required for CL patients with more complex needs.
2. To perform the techniques of retinoscopy, refraction, and over-refraction in the routine CL patient.
3. To describe the optics of the soft contact lens and hard contact lens (e.g., rigid gas permeable CL); base curve changes, the lacrimal lens, and the optic zone.
4. To describe conversion of a spectacle prescription (Rx) to a CL Rx, including method of converting from plus to minus cylinder.
5. To describe basic CL design, using appropriate terminology.
6. To describe techniques for and perform basic CL fitting.
7. To describe selection of CL candidates with non-complex needs.
8. To use auxiliary CL instruments and tests (e.g., trial set, fluorescein testing).
9. To perform CL verification for vision correction, fit, and comfort.
10. To describe contraindications for contact lens use.

B. Cognitive skills

1. To describe fundamentals of ophthalmic optics in CL management (e.g., CL choices, techniques for fitting individuals).
2. To list indications for contact lenses in non-complex cases.
3. To describe CL choices and techniques for fitting individuals with non-complex CL needs.

C. Technical skills

1. To perform advanced retinoscopy techniques in a CL patient.
2. To perform advanced refraction techniques in a CL patient, including diagnostic fitting.
3. To perform techniques to verify and inspect contact lenses.
4. To utilize appropriate teaching skills to instruct patients in the safe insertion, removal, and care of contact lenses.

STANDARD LEVEL GOALS: PGY-3 (in addition to the Basic Level objectives and skills)

A. Objectives

1. To perform a more advanced CL history and examination, employing additional tests and questions appropriate for patients with more complex CL needs (e.g., keratoconus, difficult CL fittings).
2. To perform retinoscopy and refraction in the CL patient with more complex needs (e.g., , post-keratoplasty).
3. To describe the more advanced optics of the soft contact lens (SCL) and hard contact lens (e.g., rigid gas permeable CL); base curve changes, the lacrimal lens, and the optic zone.
4. To describe more advanced CL design (e.g., special lenses and special CL shapes or materials).
5. To describe and perform more advanced CL fitting (e.g., post-keratoplasty).
6. To describe selection of CL candidates with more complex needs (e.g., post-surgical).
7. To use auxiliary CL instruments in patients with more complex needs (e.g., post-surgical topography).
8. To perform CL verification for vision, fit, and comfort in therapeutic CL care.

B. Cognitive skills

1. To describe more advanced concepts of ophthalmic optics in CL.
2. To describe indications for more advanced CL (e.g., therapeutic lenses).

C. Technical skills

1. To perform more advanced retinoscopy techniques in a CL patient.
2. To perform more advanced refraction techniques in CL patient, including diagnostic fitting.
3. To perform advanced techniques to verify and inspect contact lenses in patients with complex CL needs.
4. To perform more advanced CL fitting in patients with complex needs (e.g., keratoconus, CL in children, active corneal disease).
5. To describe and use the CL instruments in more complex cases.
6. To describe the more advanced CL complications. (e.g. microbial keratitis, sterile corneal infiltrates, preservative toxicity)
7. To perform appropriate CL selection (e.g., material selection, CL modification).
8. To perform corneal topography to fit contact lenses.

ADVANCED LEVEL GOALS: PGY-4 (in addition to Standard Level objectives and skills)

A. Objectives

1. To perform the most advanced techniques in CL history and examination, and to understand what additional tests and questions are needed during the most complex CL examination (e.g., post-keratoplasty, multiple surgery, post-refractive, complex keratoconus fitting, active corneal disease).
2. To perform retinoscopy and refraction in the CL patient with the most complex needs (e.g., keratoglobus, keratoconus, following open globe repair [e.g., corneal laceration] or multiple keratoplasty).
3. To describe the most advanced optics and applications of soft contact lenses and hard contact lenses (e.g., piggyback CL).
4. To describe the most advanced CL design, using appropriate terminology (e.g., special fittings, special lenses for difficult-to-fit patients).
5. To describe indications for and to perform the most advanced CL fitting (e.g., post-multiple keratoplasty or traumatic corneal repair).
6. To describe indications for and apply the most complex CL in special circumstances or for candidates presenting increased level of difficulty (e.g., post surgical patients, children)
7. To use the auxiliary CL instruments in patients with the most complex needs (e.g., topography, fluorescein testing, diagnostic lenses).

B. Cognitive skills

1. To describe the differences between CL material choices.
2. To describe methods of modifying a contact lens to improve comfort, vision, or physiological response.
3. To evaluate and to manage CL-induced complications.
4. To perform and interpret corneal topography in CL fitting.

C. Technical skills

1. To perform CL modification in complex cases.
2. To select the appropriate CL in more complex cases.

CHAPTER 6. CORNEA, EXTERNAL DISEASE AND REFRACTIVE SURGERY

BASIC LEVEL GOALS: PGY-2

A. Cognitive skills

1. To describe the basic anatomy, embryology, physiology, pathology, microbiology, immunology, genetics, epidemiology, and pharmacology of the cornea, conjunctiva, sclera, eyelids, lacrimal apparatus, and ocular adnexa.
2. To describe congenital abnormalities of the cornea, sclera, and globe (e.g., Peters' anomaly, microphthalmos, birth trauma, buphthalmos).
3. To describe characteristic corneal and conjunctival degenerations (e.g., pterygium, pinguecula, Salzmann, senile plaques of the sclera, keratoconus).
4. To recognize the common corneal dystrophies and degenerations (e.g., map-dot-fingerprint, Meesman's dystrophy, Reiss-Buckler dystrophy, Francois dystrophy, Schnyder dystrophy, congenital hereditary stromal dystrophy, lattice dystrophy, granular dystrophy, macular dystrophy, congenital hereditary endothelial dystrophy, Fuchs' dystrophy, posterior polymorphous dystrophy, Salzmann's degeneration).
5. To recognize the common corneal inflammations and infections (e.g., herpes simplex, syphilis, interstitial keratitis).
6. To understand the fundamentals of corneal optics and refraction (e.g., keratoconus).
7. To describe the fundamentals of ocular microbiology and recognize corneal and conjunctival inflammations and infections (e.g., Staphylococcal hypersensitivity, simple microbial keratitis, simple conjunctivitis, trachoma, ophthalmia neonatorum, herpes zoster ophthalmicus, herpes simplex keratitis and conjunctivitis).
8. To recognize the basic presentations of ocular allergy (e.g., phlyctenules, seasonal hay fever, vernal conjunctivitis, allergic and atopic conjunctivitis, giant papillary conjunctivitis).
9. To recognize and treat lid margin disease (e.g., Staphylococcal blepharitis, meibomian gland dysfunction).
10. To describe the features of, diagnose, and treat (or refer) vitamin A deficiency (e.g., Bitot spots, dry eye, slowed dark adaptation) and neurotrophic corneal disease.
11. To describe the basic differential diagnosis of the acute and chronic conjunctivitis or "red eye" (e.g., scleritis, episcleritis, conjunctivitis, orbital cellulitis, gonococcal and chlamydial conjunctivitis).
12. To describe the basic mechanisms of traumatic and toxic injury to the anterior segment (e.g., alkali burn, lid laceration, orbital fracture, etc.).
13. To understand the mechanisms of ocular immunology and recognize the external manifestations of anterior segment inflammation (e.g., red eye associated with acute and chronic iritis).
14. To describe the basic principles of ocular pharmacology of anti-infective, anti-inflammatory and immune modulating agents (e.g., indications and contraindications for topical corticosteroids and antibiotics).
15. To recognize corneal lacerations (perforating and non-perforating), pterygia that may require surgery, corneal and conjunctival foreign bodies.
16. To diagnose and treat corneal exposure (e.g., lubrication, temporary tarsorrhaphy).
17. To describe the epidemiology, differential diagnosis, evaluation and management of common benign and malignant lid lesions, including pigmented lesions of the conjunctiva and lid (e.g., nevi, melanoma, primary acquired melanosis)
18. To describe the epidemiology, classification, pathology, indications for surgery, and prognosis of common malpositions of the eyelids (e.g., blepharoptosis, trichiasis, distichiasis,

essential blepharospasm, entropion, ectropion) and understand their relationship to secondary diseases of the cornea and conjunctiva (e.g., exposure keratopathy).

19. To recognize and describe the treatment for a chemical burn (e.g., types of agents, medical therapy).
20. To recognize and describe the etiologies of hyphema and microhyphema.
21. To describe the etiologies and treatment of superficial punctate keratitis (e.g., dry eye, Thygeson's superficial punctate keratopathy), blepharitis, toxicity, ultraviolet photokeratopathy, contact lens related).
22. To describe the symptoms and signs, testing and evaluation for, and treatment of exposure keratopathy and dry eye (e.g., Schirmer testing).
23. To recognize the anterior segment manifestations of systemic disease (e.g., Wilson's disease) and pharmacologic side effects (e.g., amiodarone vortex keratopathy).
24. To recognize, list the differential diagnosis, and evaluate aniridia and other developmental anterior segment abnormalities (e.g., Axenfeld's, Rieger's, Peters' anomalies and related syndromes).
25. To recognize and treat pyogenic granuloma.

B. Technical/surgical skills

1. To perform external examination (illuminated and magnified) and slit lamp biomicroscopy, including drawing of anterior segment findings.
2. To administer topical anesthesia, as well as special topical stains of the cornea (e.g., fluorescein dye and Rose Bengal).
3. To perform simple tests for dry eye (e.g., Schirmer test).
4. To perform punctal occlusion (temporary or permanent) or insert plugs.
5. To perform simple corneal sensation testing (e.g., cotton tip swab).
6. To perform tonometry (e.g., applanation, tonopen, Schiötz, pneumotometry).
7. To perform techniques of sampling for viral, bacterial, fungal, and protozoal ocular infections (e.g., corneal scraping and appropriate culture techniques).
8. To perform and interpret simple stains of the cornea and conjunctiva (e.g., culture techniques, culture media, Gram stain, Giemsa stain, calcofluor white, acid fast).
9. To manage corneal epithelial defects (e.g., pressure patching and bandage contact lenses).
10. To perform removal of a conjunctival or corneal foreign body (e.g., rust ring).
11. To perform simple pterygium excision.
12. To perform a simple lid laceration repair.
13. To perform a simple corneal laceration repair (e.g., linear laceration not extending to limbus).
14. To perform epilation.
15. To perform a lateral tarsorrhaphy.
16. To incise/drain or remove a simple chalazion/stye.
17. To perform a simple incisional or excisional biopsy of a lid lesion.
18. To perform irrigation of chemical burn to the eye.
19. To treat hyphema and microhyphema (e.g., complications of increased intraocular pressure and rebleeding).

STANDARD LEVEL GOALS: PGY-3 (In addition to Basic Level goals)

A. Cognitive skills

1. To describe the more complex anatomy, embryology, physiology, pathology, microbiology, immunology, genetics, epidemiology, and pharmacology of the cornea, conjunctiva, sclera, eyelids, lacrimal apparatus, and ocular adnexa.
2. To describe the more complex congenital abnormalities of the cornea, sclera, and globe (e.g., hamartomas and choristomas).
3. To describe, recognize, evaluate, and treat peripheral corneal thinning (e.g., inflammatory, degenerative, dellen-related, infectious, allergic).
4. To recognize the common conjunctival neoplasms (e.g., benign, malignant tumors).
5. To recognize and treat less common corneal or conjunctival presentations of degenerations (e.g., inflamed or atypical pterygium, band keratopathy).
6. To describe the epidemiology, differential diagnosis, evaluation, and management of Bitot's spots.
7. To describe the epidemiology, differential diagnosis, evaluation, and management of Thygeson's superficial punctate keratopathy.
8. To understand more complex corneal optics and refraction (e.g., irregular astigmatism).
9. To correlate the concordance of the visual acuity with the density of media opacity (e.g., cataract) and to evaluate the etiology of discordance between acuity and media examination findings.
10. To describe more complex ocular microbiology and describe the differential diagnosis of more complicated corneal and conjunctival infections (e.g., complex or atypical bacterial fungal, Acanthamoeba, viral, or parasitic keratitis).
11. To describe differential diagnosis, evaluation, and treatment of interstitial keratitis (e.g., syphilis, viral diseases, inflammation).
12. To describe more complex differential diagnosis of the "red eye" (e.g., autoimmune and inflammatory disorders causing scleritis, episcleritis, conjunctivitis, orbital cellulitis).
13. To describe key features of trachoma, including epidemiology, clinical features and staging, complications (e.g., cicatricization), prevention (e.g., facial hygiene), and topical and systemic antibiotic treatment (especially in hyperendemic regions) and surgery (e.g., tarsal rotation).
14. To describe more complex mechanisms of traumatic and toxic injury to the anterior segment (e.g., long-term sequelae of acid and alkali burn, complex lid laceration involving the lacrimal system, full-thickness laceration).
15. To describe the differential diagnosis and the external manifestations of more complex anterior segment inflammation (e.g., acute and chronic iritis).
16. To describe the more complex principles of ocular pharmacology of anti-infective, anti-inflammatory and immune modulating agents (e.g., use of topical non-steroidal and steroidal agents, topical cyclosporine).
17. To recognize and treat corneal lacerations (perforating and non-perforating).
18. To recognize and treat large or atypical pterygia that may require surgery.
19. To describe and treat corneal and conjunctival foreign bodies.
20. To diagnose and treat severe corneal exposure (e.g., lubrication, temporary tarsorrhaphy)
21. To recognize and treat common and uncommon benign and malignant lid lesions.
22. To recognize and treat common malpositions of the eyelids (e.g., entropion, ectropion, and ptosis) as they apply to secondary corneal disease.
23. To recognize and treat recurrent corneal erosions.
24. To recognize and treat foreign body, animal, and plant substance injuries.
25. To recognize and treat more complex hyphemas (e.g., surgical indications).
26. To recognize, evaluate, and treat chronic conjunctivitis (e.g., chlamydia, trachoma, molluscum contagiosum, Parinaud's oculoglandular syndrome, ocular rosacea).
27. To describe the epidemiology, clinical features, pathology, evaluation, and treatment of ocular cicatricial pemphigoid.
28. To recognize, evaluate, and treat the ocular complications of severe diseases, such as chronic exposure keratopathy, contact dermatitis, and Stevens-Johnson syndrome.

29. To describe the epidemiology, clinical features, pathology, evaluation, and treatment of peripheral corneal thinning or ulceration (e.g., Terrien's marginal degeneration, Mooren's ulcer, rheumatoid arthritis-related corneal melt).

B. Technical/surgical skills

1. To perform more advanced techniques, including keratometry, keratoscopy, endothelial cell count and evaluation, specular microscopy, and pachymetry.
2. To perform stromal micropuncture.
3. To perform application of corneal glue.
4. To assist in more complex corneal surgery (e.g., penetrating keratoplasty and phototherapeutic keratectomy).
5. To perform more advanced tests for dry eye (e.g., modified Schirmer tests, assessment of tear break up time, fluorescein dye testing, Rose Bengal dye).
6. To perform a more complex pterygium excision, including conjunctival grafting.
7. To perform a more complex lid laceration repair.
8. To perform manual superficial or lamellar keratectomy.
9. To perform a more complex corneal laceration repair (e.g., stellate perforating laceration).
10. To repair simple lacerations of the lacrimal drainage apparatus (e.g., perform intubations and simple closure).

ADVANCED LEVEL GOALS: PGY-4 (In addition to Standard Level goals)

A. Cognitive skills

1. To describe the most complex anatomy, embryology, physiology, histopathology, microbiology, immunology, genetics, epidemiology, and pharmacology of the cornea, conjunctiva, sclera, eyelids, lacrimal apparatus, and ocular adnexa.
2. To describe the most complex and less common congenital abnormalities of the cornea, sclera, and globe (e.g., cornea plana, keratoglobus).
3. To recognize common and uncommon corneal and conjunctival neoplasms, dystrophies and degenerations (e.g., lattice dystrophy).
4. To understand the most complex corneal optics and refraction (e.g., post-keratoplasty).
5. To describe less common and rare ocular infections and describe the differential diagnosis of the most complicated corneal and conjunctival infections (e.g., amoebas, Leishmaniasis, nematodes).
6. In non-endemic areas, to describe the basic features of onchocerciasis.
7. In endemic areas to define the etiology, vector (e.g., black fly), and incidence, diagnostic features (e.g., microfilariae, keratitis, iritis), diagnosis (e.g., skin snip test), course and prognosis, treatment (e.g., Ivermectin, nodulectomy), and prevention (e.g., vector control, environmental and behavioral changes) of onchocerciasis.
8. To describe the most complex differential diagnosis of the "red eye" (e.g., pemphigoid, pemphigus, Stevens-Johnson syndrome).
9. To diagnose and treat the most complex traumatic and toxic injuries to the anterior segment (e.g., total lid avulsion, severe alkali burn).
10. To describe the differential diagnosis and the external manifestations of the most complex or uncommon anterior segment inflammations (e.g., syphilitic keratouveitis).
11. To describe the most complex principles of ocular pharmacology of anti-infective, anti-inflammatory and immune modulating agents (e.g., combination therapies of antiviral and anti-inflammatory agents).

12. To recognize and treat complex corneal lacerations (e.g., lacerations extending beyond the limbus).
13. To diagnose and treat the most severe corneal exposure cases (e.g., conjunctival flap).
14. To understand ocular surface transplantation, including conjunctival autograft/flap, amniotic membrane transplantation, limbal stem cell transplantation.
15. To understand the surgical indications (e.g., Fuchs' dystrophy, aphakic/pseudophakic bullous keratopathy), surgical techniques, and recognition and management of postoperative complications (especially immunologically-mediated rejection) of corneal transplantation (e.g., penetrating, lamellar).
16. To understand the preoperative assessment, patient selection, surgical management, and postoperative care of refractive surgical techniques, including keratotomy (radial, astigmatic), photoablation (photorefractive, phototherapeutic, LASIK), corneal wedge resection, thermokeratoplasty, intracorneal rings, phakic intraocular lens and clear lens extraction.

B. Technical/surgical skills

1. To perform and interpret the most advanced corneal techniques (e.g., pachymetry, endothelial microscopy, computerized corneal topography).
2. To understand and perform specialized and complicated contact lens fitting (e.g., post-keratoplasty).
3. To perform more complex corneal surgery (e.g., penetrating or lamellar keratoplasty, procedures and phototherapeutic keratectomy).
4. To repair simple entropion and ectropion.
5. To perform a thin conjunctival flap (e.g., Gunderson flap).
6. To perform other complex conjunctival surgery (e.g., autograft, stem cell transplant).
7. To perform basic non-laser refractive surgery techniques (e.g., relaxing keratotomy).
8. To manage and treat more complex neoplasms of the conjunctiva (e.g., carcinoma, melanoma).

CHAPTER 7. GLAUCOMA

BASIC LEVEL GOALS: PGY-2

A. Cognitive skills

1. To describe the epidemiology of primary open angle glaucoma (POAG).
2. To perform evaluation of POAG.
3. To describe the mechanics of aqueous humor dynamics and the anatomy of the anterior chamber and its angle.
4. To describe basic tonometry and to understand the principles of tonography.
5. To describe optic nerve and nerve fiber layer anatomy in glaucoma.
6. To describe fundamentals of perimetry, including kinetic and automated static perimetry.
7. To describe principles, indications, and basic techniques of gonioscopy, including normal and abnormal findings.
8. To describe principles of medical management, including indications for and side effects of options (e.g., topical and systemic medications) for simple glaucoma (e.g., POAG, angle closure glaucoma).
9. To describe and recognize normal tension glaucoma (“low tension glaucoma”).
10. To describe the features of and recognize primary and secondary angle closure glaucoma and aqueous misdirection.
11. To describe the clinical features of and to recognize hypotony (e.g., Seidel test for transconjunctival leakage).
12. To list the main results of the major clinical trials in glaucoma (e.g., Glaucoma Laser Trial, Normal Tension Glaucoma Study, and Advanced Glaucoma Intervention Study [see Appendix]).

B. Technical skills

1. To perform basic tonometry (e.g., applanation, Schiøtz[if applicable], tonopen, airpuff) and recognize the pitfalls and artifacts of the testing.
2. To perform basic gonioscopy (e.g., recognize angle structures, identify angle closure).
3. To perform stereo examination of the optic nerve, using 90 diopter or other lens.
4. To interpret manual (e.g., Goldmann) and automated (e.g., Humphrey, Octopus) visual fields in routine glaucoma.

STANDARD LEVEL GOALS: PGY-3 (in addition to Basic Level goals)

A. Cognitive skills

1. To describe the epidemiology and perform screening for routine and more advanced primary and secondary open angle glaucoma.
2. To describe the treatment of disturbances of aqueous humor dynamics.
3. To describe the more complex etiologies for, evaluation of, and treatment of glaucoma (e.g., angle recession, inflammatory, steroid-induced, pigmentary, pseudoexfoliative, phacolytic, neovascular, post-operative, malignant, lens particle glaucomas; plateau iris; glaucomatocyclitic crisis; iridocorneal endothelial syndromes; aqueous misdirection).
4. To describe more advanced tonometric and tonographic (if applicable) methods (e.g., diurnal curve).
5. To describe more advanced optic nerve and nerve fiber layer anatomy in primary and secondary glaucoma and to recognize typical and atypical features associated with glaucomatous cupping (e.g., rim pallor, rapid progression, central acuity loss, hemianopic or other non-glaucomatous types of visual field loss).

6. To describe more advanced forms of perimetry (e.g., kinetic and automated static visual fields) and perimetry strategies (e.g., threshold testing, supra-threshold testing, special algorithms).
7. To describe the principles, indications, and more advanced anatomic findings and gonioscopic features of primary and secondary glaucomas (e.g., plateau iris, appositional closure).
8. To describe the principles of medical management of more advanced glaucomas (e.g., advanced POAG, secondary open and closed angle glaucomas, normal tension glaucoma)
9. To describe the features of, recognize, and treat primary angle closure glaucoma and aqueous misdirection.
10. To describe the clinical features of, recognize, and treat less common etiologies of ocular hypotony.
11. To describe the results and apply the conclusions to clinical practice of the major clinical trials in glaucoma (e.g., Glaucoma Laser Trial, Normal Tension Glaucoma Study, and Advanced Glaucoma Intervention Study; see more complete list of clinical trials in Appendix 1).
12. To recognize and treat the various adult secondary glaucomas.
13. To describe the features of primary infantile and juvenile glaucomas.
14. To describe and apply specific medical treatments of more advanced glaucoma.
15. To describe the principles of laser treatments of glaucoma (e.g., indications, techniques, and complications, use of various types of laser energy, spot size, laser wavelengths).
16. To describe the surgical treatment of glaucoma: (e.g., trabeculectomy, combined cataract and trabeculectomy, setons, and cyclodestructive procedures, including indications, techniques, and complications).

B. Technical/ surgical skills

1. To perform YAG laser posterior capsulotomy for uncomplicated posterior capsule opacity.
2. To perform argon or YAG laser peripheral iridotomy for routine angle closure glaucoma.
3. To perform argon laser trabeculoplasty for uncomplicated glaucoma.
4. To perform cyclophotocoagulation.
5. To perform routine first trabeculectomy with or without antimetabolites.
6. To describe and manage a flat anterior chamber.
7. To perform routine revision of filtering blebs.

ADVANCED LEVEL GOALS: PGY-4 (in addition to Standard Level goals)

A. Cognitive skills

1. To describe the features of the most complex and most advanced forms of primary and secondary open angle glaucoma.
2. To describe the mechanics of aqueous humor dynamics in the most advanced and complex etiologies of glaucoma (e.g., angle recession, combined or multifactorial glaucoma, traumatic or inflammatory glaucoma, pigmentary dispersion glaucoma).
3. To apply in clinical practice tonometric and tonographic methods (e.g., diurnal curve) in complicated or atypical cases of glaucoma.
4. To apply the most advanced knowledge of optic nerve and nerve fiber layer anatomy and describe techniques, methods, and tools for analyzing the nerve fiber layer.
5. To recognize and evaluate atypical or multifactorial glaucomatous cupping (e.g., rim pallor).
6. To describe, interpret, and apply the results of the most complex and advanced forms of perimetry, including special kinetic and automated static perimetry strategies (e.g., special algorithms) in atypical or multifactorial glaucoma.
7. To describe the principles and indications, and apply to clinical practice the findings of gonioscopy in the most complex primary and secondary glaucomas.

8. To describe the principles of medical management of the most advanced and complex glaucoma (e.g., advanced POAG previously treated with medicine, laser or surgery; secondary glaucomas).

9. To describe, recognize, and treat the most advanced cases of primary open angle glaucoma (e.g., monocular patients, repeat surgical cases), normal tension glaucoma, and secondary glaucomas (e.g., inflammatory glaucoma, angle recession).

10. To describe the features of, recognize, and treat the most advanced cases of primary angle closure glaucoma and complex glaucomas (e.g., post-operative cases, secondary angle closure, aqueous misdirection).

11. To describe the clinical features of, recognize and treat common and uncommon etiologies of ocular hypotony (e.g., choroidal detachment, leaking trabeculectomy bleb).

12. To describe the results, apply the conclusions, and critically analyze the major clinical trials in glaucoma (e.g., Glaucoma Laser Trial, Normal Tension Glaucoma Study, and Advanced Glaucoma Intervention Study), as well as describe and use other publications in the management of glaucoma patients (see Appendix 1).

13. To recognize and treat uncommon adult secondary glaucomas.

14. To describe the features of and treat or refer the primary infantile and juvenile glaucomas.

15. To describe and apply specific medical treatments in the most complex and most advanced cases (e.g., refractory glaucoma, monocular patients, non-compliant patients).

16. To describe the principles, indications, and complications of laser treatment of more advanced or complex glaucoma (repeat procedures).

17. To describe the more advanced surgical treatment of glaucoma: (e.g., trabeculectomy, combined cataract and trabeculectomy, setons, and cyclodestructive procedures, including indications, techniques, and complications).

B. *Technical/surgical skills*

1. To perform YAG or argon laser procedures in glaucoma patients (e.g., monocular patient, repeat laser, vitreous lysis, suture lysis).

2. To perform laser peripheral iridotomy for more advanced glaucoma (e.g., monocular patient, acute angle closure, hazy cornea).

3. To perform laser treatments (e.g., argon laser trabeculoplasty, iridoplasty) for more advanced glaucoma cases (repeat treatments, monocular patient).

4. To perform cyclophotocoagulation for more advanced cases (e.g., monocular).

5. To perform routine and repeat trabeculectomy with or without antimetabolites.

6. To describe, manage, and treat surgically, if necessary, a flat anterior chamber.

7. To perform more advanced techniques for the revision of filtering blebs (e.g., failing bleb, leaking bleb)

8. To recognize and treat glaucoma surgery bleb complications.

CHAPTER 8. NEURO-OPHTHALMOLOGY

BASIC LEVEL GOALS: PGY-2

A. Cognitive skills

1. To describe the neuro-anatomy of the visual pathways.
2. To describe the neuro-anatomy of the cranial nerves.
3. To describe the pupillary and accommodative neuro-anatomy.
4. To describe ocular motility and related neuronal pathways.
5. To describe the typical features, evaluation, and management of the most common optic (e.g., demyelinating optic neuritis, ischemic optic neuropathy [arteritic and non-arteritic], toxic or nutritional optic neuropathy, Leber's hereditary optic neuropathy, ethambutol toxicity, neuroretinitis, and compressive, inflammatory, infiltrative, and traumatic optic neuropathies).
6. To describe the typical features, evaluation, and management of the most common ocular motor neuropathies (e.g., third, fourth, sixth nerve palsy).
7. To describe the typical features of cavernous sinus and superior orbital fissure syndromes (e.g., infectious, vascular, neoplastic, inflammatory etiologies).
8. To describe the typical features, evaluation, and management of the most common causes of nystagmus (e.g., congenital motor and sensory, downbeat, upbeat, gaze-evoked, drug-induced).
9. To describe the typical features, evaluation, and management of the most common pupillary abnormalities (e.g., relative afferent pupillary defect, anisocoria, Horner syndrome, third nerve palsy, Adie's tonic pupil).
10. To describe the typical features, evaluation, and management of the most common visual field defects (e.g., optic nerve, optic chiasm, optic radiation, occipital cortex).
11. To describe the epidemiology, clinical features, evaluation, and management of ocular myasthenia gravis.
12. To describe the epidemiology, clinical features, evaluation, and management of carotid-cavernous fistula.
13. To describe the epidemiology, differential diagnosis, evaluation and management of congenital optic nerve abnormalities (e.g., optic pit, disc coloboma, papillo-renal syndrome, morning glory syndrome, tilted disc, optic nerve hypoplasia, myelinated nerve fiber layer, melanocytoma, disc drusen, Bergmeister's papilla).

B. Technical skills

1. To perform a basic pupillary examination
 - a. To describe indications for and perform basic pharmacologic pupillary testing for Horner syndrome, pharmacologic dilation, and Adie's tonic pupil.
 - b. To list the differential diagnosis of anisocoria (e.g., sympathetic or parasympathetic lesion, "physiologic").
 - c. To describe, detect, and quantitate a relative afferent pupillary defect.
 - d. To list the causes for light-near dissociation (e.g., Argyll-Robertson pupils, diabetic neuropathy, tonic pupil).
2. To perform a basic ocular motility examination
 - a. To assess ocular alignment using simple techniques (e.g., Hirschberg, Krimsky).
 - b. To describe and perform basic cover/uncover testing for tropia.
 - c. To describe and perform alternate cover testing for phoria.
 - d. To perform simultaneous prism and cover testing.
 - e. To perform measurement of deviations with prisms.
 - f. To describe the indications for and apply Fresnel and grind-in prisms.

- g. To describe the indications for and to perform forced duction and forced generation testing.
 - h. To perform an assessment of saccade accuracy and pursuit and optokinetic testing.
 - i. To perform a measurement of eyelid function (e.g., levator function, lid position).
3. To describe the indications for visual field testing and to perform and interpret perimetry studies
 - a. To perform confrontational field testing (static and kinetic, central and peripheral, red and white targets).
 - b. To perform and interpret a tangent screen test.
 - c. To describe the indications for and perform basic Goldmann perimetry, and interpret results.
 - d. To describe the indications for and perform basic automated perimetry, and interpret results.
 4. To perform basic direct, indirect, and magnified ophthalmoscopic examination of the optic disc (e.g., recognize optic disc swelling, optic atrophy, neuroretinitis).
 5. To describe the anatomy and indications for, order appropriately, and interpret basic radiology studies of the brain and orbits, demonstrating the ability to communicate with radiologists in order maximize both choice of proper diagnostic test and accuracy of interpretation.
 6. To describe the indications for and interpret basic echography of orbits.

STANDARD LEVEL GOALS (in addition to Basic Level goals)

A. Cognitive skills

1. To describe typical and atypical features, evaluation, and management of the most common optic neuropathies (e.g., papilledema, optic neuritis, ischemic, inflammatory, infectious, infiltrative, compressive, and hereditary optic neuropathies).
2. To describe typical and atypical features, evaluation, and management of the more complex supranuclear and internuclear palsies and less common ocular motor neuropathies (e.g., progressive supranuclear palsy and internuclear ophthalmoplegia).
3. To describe typical and atypical features, evaluation, and management of the more complex and less common forms of nystagmus (e.g., rebound, convergence, retraction).
4. To describe typical and atypical features, evaluation, and management of the more complex and less common pupillary abnormalities (e.g., light-near dissociation, pharmacologic miosis).
5. To describe typical and atypical features, evaluation, and management of the more complex and less common visual field defects (e.g., lateral geniculate, monocular temporal crescent).
6. To describe more advanced aspects of visual field indications, selection, and interpretation (e.g., artifacts of automated perimetry, testing and thresholding strategies).
7. To describe neuro-ophthalmic aspects of common systemic diseases (e.g., hypertension, diabetes, thyroid disease, myasthenia gravis, temporal arteritis, systemic infections and inflammation).
8. To describe neuro-ophthalmologic findings in trauma (e.g., traumatic optic neuropathy, traumatic brain injury).
9. To describe typical features of inherited neuro-ophthalmologic diseases (e.g., Leber's hereditary optic neuropathy, autosomal dominant optic atrophy, spinocerebellar degenerations).
10. To recognize, evaluate, and treat ocular myasthenia gravis.

B. Technical skills

1. To describe the indications for, administer, and interpret the results of intravenous edrophonium (Tensilon) and prostigmine tests for myasthenia gravis.

2. To perform a detailed cranial nerve evaluation (e.g., testing of trigeminal and facial nerve function).
3. To describe the more advanced interpretation of neuro-radiologic images (e.g., indications and interpretation of orbital tumors, thyroid eye disease, pituitary adenoma, optic nerve glioma, optic nerve sheath meningioma).
4. To describe the evaluation, management, and specific testing (e.g., stereopsis, mirror test, red-green testing) of patients with “functional” visual loss (e.g., recognize non-organic spiral or tunnel visual fields).
5. To describe the indications for, to perform, and to list the complications of temporal artery biopsy.

ADVANCED LEVEL GOALS (in addition to Standard Level goals)

A. Cognitive skills

1. To describe typical and atypical features, evaluation, and management of the most advanced and least common optic neuropathies (e.g., chronic or recurrent optic neuritis, and posterior ischemic, autoimmune, toxic/nutritional).
2. To describe typical and atypical features, evaluation, and management of the most complex and least common ocular motor neuropathies and their mimics (e.g., progressive supranuclear palsy).
3. To describe typical and atypical features, evaluation, and management of the most complex and least common forms of nystagmus (e.g., surgical treatment options, using the null point in either prism or surgical therapy).
4. To describe typical and atypical features, evaluation, and management of the most advanced and least common pupillary abnormalities (e.g., pupil findings in coma, transient pupillary phenomenon).
5. To describe typical and atypical features, evaluation, and management of the most complex and least common visual field defects (e.g., combination or bilateral lesions, cortical visual impairment).
6. To describe the most advanced aspects of visual field indications, selection, and interpretation (e.g., variability in automated perimetry, application of specific testing and thresholding strategies for different patient populations with different neuro-ophthalmic conditions, different testing abilities (e.g., young or old age, mental status, hand-eye coordination, reaction time)).
7. To describe, evaluate, and treat the neuro-ophthalmic aspects of systemic diseases (e.g., malignant hypertension, diabetic papillopathy, toxicity of systemic medications, pseudotumor cerebri).
8. To describe, evaluate, and treat the neuro-ophthalmologic manifestations of trauma (e.g., corticosteroid or surgical therapy in traumatic optic neuropathy).
9. To describe, evaluate, and provide appropriate genetic counseling for neuro-ophthalmologic diseases (e.g., Leber’s hereditary optic neuropathy, chronic progressive external ophthalmoplegia, Hippel-Lindau syndrome).
10. To recognize, evaluate, and treat (or refer) more complex forms of nystagmus.
11. To recognize, evaluate, and treat (or refer) transient monocular or binocular visual loss.

B. Technical skills

1. To perform and interpret the results of the intravenous edrophonium (Tensilon) and prostigmine tests for myasthenia gravis, and to recognize and treat the complications of the procedures.

2. To perform and interpret the complete cranial nerve evaluation (e.g., testing of trigeminal and facial nerve function) and basic neurologic exam in the context of neuro-ophthalmic localization and disease.

3. To interpret neuro-radiologic images in neuro-ophthalmology (e.g., interpretation of orbital imaging for orbital pseudotumor and tumors, thyroid eye disease, intracranial imaging modalities and strategies for tumors, aneurysms, infection, inflammation, and ischemia), and to appropriately discuss, in advance of testing, the localizing clinico-radiologic features with the neuroradiologist in order to obtain the best study and interpretation of the results.

4. To recognize patients with “functional” visual loss (non-organic visual loss) and provide counseling and follow-up.

CHAPTER 9. OPHTHALMIC HISTOPATHOLOGY

BASIC LEVEL: PGY-2

A. Cognitive skills

1. To describe basic ocular anatomy and to identify the histology of the major structures of the eye (e.g., conjunctiva, sclera, cornea, anterior chamber angle, iris, ciliary body, lens, vitreous, retina, retinal pigment epithelium, choroid, optic nerve).
2. To describe basic pathophysiology of the common disease processes of the eye and to identify the major histologic findings of each (e.g., infection, inflammation, neoplasm).
3. To identify the histology of important intraocular and adnexal diseases (e.g., endophthalmitis, retinoblastoma, choroidal melanoma, microbial keratitis).

B. Technical skills (for an ocular pathology laboratory, as available)

1. To describe appropriate steps in the basic handling and processing of gross specimens in the ocular pathology laboratory (e.g., basic preparation of the specimen) and to demonstrate proficiency in these steps in the laboratory.
2. To describe specific information necessary for communication with the pathologist regarding special handling of specimens for special stains or studies.
3. To describe indications for frozen sections in ocular pathology.
4. To perform cutting and gross examination of whole globes.
5. To participate under supervision in the microscopic examination of ophthalmology specimens from active cases.

STANDARD LEVEL: PGY-3 (in addition to Basic Level skills)

A. Cognitive skills

1. To describe more advanced ocular anatomy and to identify the histology of the major and minor structures of the eye (e.g., conjunctival glands, normal pigment, common variants).
2. To describe more advanced pathophysiology of the disease processes of the eye and to identify the major histologic findings of each (e.g., fungal keratitis, skin and adnexal neoplasms, and less common intraocular tumors).
3. To identify histology of the less common but potentially vision- or life-threatening intraocular and adnexal diseases (e.g., temporal arteritis, fungal endophthalmitis, extraocular spread of intraocular tumor, metastatic disease to the eye).
4. To describe more advanced techniques in ocular histopathology (e.g., electron microscopy, immunohistochemistry, flow cytometry, tumor free margins).

B. Technical skills

1. To describe appropriate steps in the more advanced handling and special processing of gross specimens in the ocular pathology laboratory.
2. To describe specific indications for special handling and to communicate to the pathologist the necessity for special handling of specimens for special stains or studies (e.g., electron microscopy, immunohistochemistry, flow cytometry).
3. To describe indications and to perform and prepare a biopsy specimen for frozen section in ocular pathology.
4. To perform preparation of a basic histologic specimen for review by the pathologist.

5. To participate as an “at-the-elbow” observer during microscopic examination of active ophthalmology cases and to perform microscopic examination of a specimen with and without direct supervision.

ADVANCED LEVEL: PGY-4 (in addition to Standard Level skills)

A. Cognitive skills

1. To describe the most advanced ocular anatomy and to identify histology of the major and minor structures of the eye and their less common variants (e.g., pars plana cysts, iris heterochromia, cobblestone degeneration of the retina).

2. To describe the most advanced, less common, or more complex pathophysiology of the disease processes of the eye and to identify major histologic findings of each (e.g., inflammatory, lymphoma, artifacts of processing).

3. To identify the histology of the least common but potentially vision- or life- threatening intraocular and adnexal diseases (e.g., healed giant cell arteritis, mimics and masqueraders of inflammation or neoplasm, uncommon benign and malignant neoplasms).

B. Technical skills

1. To describe and to perform appropriate steps for handling gross specimens in the ocular pathology laboratory.

2. To perform pre-operative, intra-operative, and post-operative consultation with the pathologist, regarding specific indications for special stains or processing (e.g., orientation of specimen, special handling).

3. To perform and interpret the pathologic report of frozen section in ocular pathology.

4. To perform the preparation of a basic and more advanced histologic specimens for review by the pathologist (e.g., simple special stains or fixation methods).

5. To participate as an “at-the-elbow” observer during the microscopic examination of active ophthalmology cases.

6. To perform microscopic examination of a specimen with and without direct supervision and to provide a relevant differential diagnosis.

CHAPTER 10. OCULOPLASTIC SURGERY AND ORBIT

BASIC LEVEL GOALS (PGY-2)

A. Cognitive skills

1. To describe basic eyelid, lacrimal, and orbital anatomy and physiology (e.g., eyelid, orbicularis, orbital structures, meibomian glands, lacrimal glands, glands of Zeiss, Whitnall's ligament, Muller's muscle, Lockwood's ligament, canaliculi, puncta, orbital bones, orbital foramina, paranasal sinuses, annulus of Zinn, arterial and venous vascular supply, lymphatics, nerves, extraocular muscles).
2. To describe basic mechanisms and indications for treatment of eyelid, orbital, and lacrimal trauma.
3. To describe epidemiology, clinical features, evaluation, and management of fetal alcohol syndrome.
4. To perform pre-operative and post-operative assessment of patients with common oculoplastic disorders.
5. To recognize simple orbital trauma (e.g., orbital foreign body, retrobulbar hemorrhage).
6. To recognize and treat floppy eyelid syndrome.
7. To recognize and treat simple trichiasis.
8. To recognize blepharospasm and hemifacial spasm.
9. To describe the differential diagnosis of common orbital tumors in children and adults.
10. To describe the differential diagnosis of lacrimal gland mass (e.g., inflammatory, neoplastic, congenital, infectious).
11. To identify normal orbital anatomy on imaging studies (e.g., magnetic resonance imaging, computed tomography, ultrasound).
12. To describe the differential diagnosis of proptosis in children and adults.
13. To describe techniques and complications of minor operating room procedures (e.g., incision and drainage of chalazia, excision of small eyelid lesions).
14. To describe typical features of orbital cellulitis.

B. Technical/surgical skills

1. To describe indications for and to perform the basic office examination techniques for the most common oculoplastic and orbital abnormalities.
2. To identify indications for and to perform the basic assessment of the eyelids (e.g., eversion, double eversion) and eyebrows (e.g., margin to reflex distance, lid crease, levator function, eyelid/brow malpositions).
3. To identify indications for and to perform the basic lacrimal assessment (e.g., dye testing, punctal dilation, lacrimal probing, canalicular probing, lacrimal irrigation).
4. To identify indications for and to perform the basic assessment of the orbit (e.g., Hertel exophthalmometry, inspection, palpation, auscultation).
5. To identify indications for and to perform the basic socket assessment (e.g., types of implants, socket health).
6. To perform minor lid procedures (e.g., removal of benign eyelid skin lesions, chalazion curettage or excision, conjunctival biopsy).
7. To treat complications of minor operating room procedures (e.g., incision and drainage of chalazia, excision of small eyelid lesions).

8. To perform punctal plug insertion or removal.
9. To recognize and treat trichiasis (e.g., epilation, cryotherapy, surgical therapy).
10. To perform a simple enucleation or evisceration under supervision.

STANDARD LEVEL GOALS: PGY-3 (in addition to Basic Level goals)

A. Cognitive skills

1. To describe more advanced eyelid, lacrimal, and orbital anatomy and physiology (e.g., lacrimal apparatus, orbital vascular anatomy).
2. To describe the genetics (where known), clinical features, evaluation, and treatment of congenital eyelid deformities (e.g., coloboma, distichiasis, epicanthus, telecanthus, blepharophimosis, ankyloblepharon, epiblepharon, euryblepharon, and Goldenhar, Treacher-Collins, Waardenburg).
3. To describe the clinical features, evaluation and management of congenital orbital deformities (e.g., synophthalmia, anophthalmia, microphthalmia, cryptophthalmia, hypertelorism, hypotelorism).
4. To describe the genetics, clinical features, evaluation, and management of common and other congenital malformations (e.g., Crouzon, Apert).
5. To treat (or refer for treatment) congenital eyelid abnormalities (see Basic Level, above).
6. To perform pre-operative and post-operative assessment of patients with simple and more serious oculoplastic disorders (e.g., multi-disciplinary procedures).
7. To describe the mechanisms and indications for treatment of more advanced eyelid, orbital, and lacrimal trauma (e.g., full thickness lid laceration, chemical burns to the face).
8. To describe features of, recognize, evaluate, and treat more complicated cases of nasolacrimal duct obstruction, canaliculitis, dacryocystitis, acute and chronic dacryoadenitis, preseptal cellulitis, and cellulitis.
9. To recognize, evaluate and treat thyroid ophthalmopathy (e.g., epidemiology, symptoms and signs, orbital imaging, differential diagnosis, surgical, medical, and radiation indications, side effects of treatment).
10. To recognize, evaluate and treat orbital inflammatory pseudotumor (e.g., epidemiology, symptoms and signs, orbital imaging, differential diagnosis, biopsy indications, choice of treatments).
11. To recognize, treat, or refer blepharospasm or hemifacial spasm.
12. To recognize less common orbital tumors (e.g., metastatic lesions).

B. Technical/surgical skills

1. To describe indications for and to perform more advanced examination techniques for less common oculoplastic and orbital abnormalities (e.g., measurement of levator function, orbital ultrasound interpretation).
2. To identify indications for and to perform more advanced assessment of eyelids and eyebrows (e.g., hypoglobus, facial asymmetry, brow ptosis).
3. To identify indications for and to perform more advanced lacrimal assessment (e.g., interpretation of dye testing, canalicular probing in trauma).
4. To identify indications for and to perform more advanced assessment of the orbit (e.g., enophthalmus, interpretation of orbital ultrasound in common conditions).
5. To identify indications for and to perform more advanced socket assessment (e.g., extrusion of implants, anophthalmic socket complications).
6. To perform more complicated minor lid procedures (e.g., larger benign skin lesions) or surgery (e.g., recurrent or multiple chalazion).

7. To recognize the indications and complications and to perform more complex minor operating room limited operating room procedures (e.g., incision and drainage of recurrent or larger chalazia, excision of moderate sized benign eyelid lesions).
8. To recognize and treat orbital trauma (e.g., intraorbital foreign body, retrobulbar hemorrhage, fracture).
9. To identify common orbital pathology (e.g., orbital fractures, orbital tumors) on imaging studies (e.g, magnetic resonance imaging, computed tomography, ultrasound).
10. To treat common presentations of preseptal or orbital cellulitis.
11. To describe, recognize the indications and complications, and to perform the basic lacrimal procedures below:
 - a. Lacrimal drainage testing (irrigation, dye disappearance test)
 - b. Lacrimal intubation
 - c. Dacryocystorhinostomy (external)

ADVANCED LEVEL GOALS: PGY-4 (in addition to Standard Level goals)

A. Cognitive skills

1. To describe the most advanced eyelid, lacrimal, and orbital anatomy and physiology.
2. To evaluate and to treat simple and more advanced eyelid, orbital, and lacrimal trauma (e.g., full thickness lid laceration, chemical burns to the face).
3. To perform pre-operative and post-operative assessment and coordination of care of patients with more advanced or complex oculoplastic disorders (e.g., systemically ill patient, multi-disciplinary procedures).
4. To describe the etiology, evaluation, and medical and surgical treatment of the following eyelid diseases
 - a. Complex ectropion (e.g., congenital, paralytic, involutinal, cicatricial, mechanical, allergic).
 - b. Complex entropion (e.g., involutinal, cicatricial, spastic, congenital).
 - c. Complex myogenic ptosis (e.g., chronic progressive external ophthalmoplegia).
 - d. Complex differential diagnosis for dermatochalasis (e.g., blepharochalasis).
 - e. Benign, pre-malignant, or malignant eyelid tumors (e.g., papilloma, keratoacanthoma, seborrheic keratosis, epidermal inclusion cyst, molluscum contagiosum, verruca vulgaris, actinic keratosis, basal cell carcinoma, squamous cell carcinoma, sebaceous cell carcinoma, melanoma).
 - f. Single or recurrent inflammatory lesions (e.g., recurrent chalazion or its mimics).
 - g. Facial dystonia (e.g., blepharospasm, hemifacial spasm).
 - h. Facial nerve palsy with exposure keratopathy (e.g. tarsorrhaphy, gold weights).
 - i. Complex lid and orbital trauma cases.

B. Technical/surgical skills

1. To describe the indications for and to perform more complicated and advanced “in office” techniques for the less common but important oculoplastic and orbital abnormalities.
2. To perform preoperative and intraoperative assessment of the eyelids and eyebrows (e.g., intraoperative adjustments).
3. To perform more advanced lacrimal assessment (e.g., intraoperative and postoperative testing, more complex trauma to lacrimal system).
4. To recognize and treat more complex or difficult socket-related problems and complications (e.g., extrusion of implants, anophthalmic socket complications).
5. To perform more complicated lid procedures (e.g., larger benign, recurrent, or multiple skin lesions).
6. To describe management of and treat lacrimal system abnormalities, including
 - a. More complex congenital disorders (e.g., canalicular stenosis)

- b. More complex acquired disorders and their treatment (e.g., conjunctivo-dacryocystorhinostomy with Jones tube)
- c. Complex moderate trauma (e.g., requiring lacrimal intubation)
- 7. To recognize typical and atypical features and to describe the differential diagnosis, clinical features, and treatment of more complicated orbital disease, including
 - a. More complex orbital infections (e.g., preseptal and orbital cellulitis, mucormycosis, Aspergillosis)
 - b. Congenital tumors (e.g., dermoid)
 - c. Fibro-osseous disorders and tumors (e.g., fibrous dysplasia, osteoma, chondrosarcoma, osteosarcoma, Paget's disease)
 - d. Vascular tumors (e.g., capillary hemangioma, cavernous hemangioma, hemangiopericytoma, lymphangioma, Kaposi's sarcoma)
 - e. Xanthomatous tumors (e.g., xanthelasma, juvenile xanthogranuloma)
 - f. Lacrimal gland tumors (e.g., benign mixed tumor, adenoid cystic carcinoma, malignant mixed tumor, lymphoma)
 - g. Neural tumors (e.g., optic nerve glioma/meningioma, neurofibromatosis, neuroblastoma)
 - h. Rhabdomyosarcoma
 - i. Orbital pseudotumor
 - j. Lymphoid lesions (e.g., lymphoid hyperplasia, lymphoma, leukemia)
 - k. Thyroid-related orbitopathy
 - l. Metastatic tumors (e.g., from breast, lung, prostate, colon, melanoma)
 - m. Trauma (e.g., orbital fractures, traumatic optic neuropathy)
 - n. Anophthalmic socket – implant exposure, volume augmentation
- 8. To describe, recognize the indications and complications, and to perform the eyelid procedures listed below
 - a. Basic biopsy techniques
 - b. Lateral tarsal strip
 - c. Specialized lid suture procedures (e.g., Quickert sutures)
 - d. Medial spindle
 - e. Retractor reinsertion
 - f. Levator advancement
 - g. Eyelid laceration/margin repair
 - h. Tarsorrhaphy
 - i. Lateral canthoplasty (canthotomy and cantholysis)
 - j. Blepharoplasty
 - k. Facial nerve palsy – gold weight placement in the lid
 - l. Simple eyelid reconstruction
 - m. Orbital approaches and incisions (e.g., Kronlein, Caldwell-Luc, transconjunctival, transnasal)
- 9. To describe, recognize the indications and complications, and perform basic orbital skills and procedures
 - a. Anterior orbitotomy for tumor biopsy/excision
 - b. Orbital floor fracture repair
- 10. To describe the indications for and to interpret CT and MRI scans (e.g., orbital trauma, orbital lesions and tumors).
- 11. To perform simple botulinum toxin injections (e.g., blepharospasm).
- 12. To identify more advanced orbital pathology (e.g., complex orbital fractures, orbital tumors) on imaging studies (e.g., magnetic resonance imaging, computed tomography, ultrasound).

CHAPTER 11. PEDIATRIC OPHTHALMOLOGY AND STRABISMUS

BASIC LEVEL GOALS: PGY-2

A. Cognitive skills

1. To describe basic examination techniques for strabismus (e.g., ductions and versions, cover and uncover testing, alternate cover testing, prism cover testing).
2. To describe basic visual development and visual assessment of the pediatric ophthalmology patient (e.g., central, steady, maintained fixation; illiterate E, Allen cards, Landolt C rings).
3. To describe basic anatomy and physiology of strabismus (e.g., innervation of extraocular muscles, primary actions, comitant and incomitant deviations, overaction and underaction, restrictive and paretic, saccades and pursuit movements).
4. To describe basic sensory adaptations for binocular vision (e.g., normal and anomalous retinal correspondence, suppression, horopter, Panum's area, fusion, stereopsis).
5. To describe and recognize pseudostrabismus.
6. To describe different etiologies of amblyopia (e.g., deprivation, ametropic, strabismic, anisometropic, organic).
7. To describe etiologies of esotropia (e.g., congenital, comitant and incomitant, accommodative and non-accommodative, decompensated, sensory, neurogenic, myogenic, neuromuscular junction, restrictive, nystagmus blockage syndrome, spasm of the near, monofixation syndrome, consecutive).
8. To describe etiologies of exotropia (e.g., congenital, comitant and incomitant, decompensated, sensory, neurogenic, myogenic, neuromuscular junction, restrictive, basic, divergence excess, exophoria, convergence insufficiency).
9. To describe various strabismus patterns (e.g., A or V pattern).
10. To describe etiologies, evaluation, and management of vertical strabismus (e.g., neurogenic, myogenic, neuromuscular junction, oblique overaction, dissociated vertical deviation, restrictive).
11. To describe non-surgical treatment of strabismus.
12. To describe different forms of childhood nystagmus.
13. To describe features, classification, and treatment indications for retinopathy of prematurity.
14. To describe etiologies and types of pediatric cataracts.
15. To describe and recognize ocular findings in child abuse (e.g., retinal hemorrhages) and appropriately refer to child protective services or other authorities.
16. To describe common hereditary or congenital ocular motility or lid syndromes (e.g., Duane syndrome, Marcus Gunn jaw winking, Brown syndrome).
17. To describe typical features of retinoblastoma.
18. To describe basic features of dyslexia.
19. To describe basic evaluation of decreased vision in infants and children (e.g., retinopathy of prematurity, hereditary retinal disorders, congenital glaucoma, measles, vitamin A deficiency).
20. To describe identifiable congenital ocular anomalies (e.g., microphthalmia, persistent fetal).
21. To describe ocular findings in inherited, metabolic disorders
 - a. *Mucopolysaccharidoses (e.g., Hurler syndrome, Scheie syndrome, Hunter syndrome, San Fillipo syndrome, Morquio syndrome, Sly syndrome).*
 - b. Lipidoses (e.g., Tay-Sachs disease, Sandhoff, Niemann-Pick, Krabbe's, Gaucher's, Fabry's, metachromatic leukodystrophy).
 - c. Aminoacidurias (e.g., homocystinuria, cystinosis, Lowe, Zellweger).
22. To describe ocular findings in chromosomal abnormalities (e.g., Trisomy 21, Trisomy 13, Trisomy

18, Short arm 11 deletion, Long arm 13 deletion, Cri du Chat, Turner).

B. Technical skills

1. To perform an extraocular muscle examination based on knowledge of the anatomy and physiology of ocular motility.
2. To assess ocular motility using ductions and versions testing.
3. To apply Hering's and Sherrington's laws.
4. To perform basic measurement of strabismus (e.g., Hirschberg, Krimsky, cover testing, prism cover testing, simultaneous prism cover test, alternate cover testing, Parks-Bielschowsky three-step test, Lancaster red-green test, Maddox rod testing, double Maddox rod testing).
5. To perform assessment of vision in the neonate, infant, and child.
6. To recognize and apply in a clinical setting the following skills in the ocular motility examination (simple, advanced)
 - a. Stereoacuity testing
 - b. Accommodative convergence/accommodation ratio (e.g., heterophoria method, gradient method)
 - c. Tests of binocularity and retinal correspondence
 - d. Cycloplegic refraction (retinoscopy)
 - e. Anterior and posterior segment examination
 - f. Basic and advanced measurement of strabismus
 - g. Cover test measurement
 - h. Assessment of vision
 - 1) Teller acuity cards
 - 2) Fixation preference test
 - 3) Standard subjective visual acuity tests
 - 4) Induced tropia test
7. To assist a primary surgeon in performing extraocular muscle surgery including:
 - a. Recession
 - b. Resection
 - c. Muscle weakening (e.g., tenotomy) and strengthening (e.g., tuck) procedures
 - d. Transposition
 - e. Use of adjustable sutures

STANDARD LEVEL GOALS: PGY-3 (in addition to the Basic Level goals)

A. Cognitive skills

1. To describe basic and more advanced strabismus examination techniques (e.g., combined vertical and horizontal prism cover testing, double Maddox rod testing).
2. To describe basic and more advanced visual development and visual assessment of the pediatric ophthalmology patient (e.g., blink, measures of fixation and following behavior, objective measures of visual acuity).
3. To describe more advanced anatomy and physiology of strabismus (e.g., torsion, tertiary actions, consecutive deviations).
4. To describe more advanced sensory adaptations (e.g., anomalous head position).
5. To describe basics of binocular sensory testing (e.g., Titmus stereo testing, Randot stereo testing, Worth 4-dot, Bagolini lenses, afterimage testing).
6. To describe and to recognize different etiologies of amblyopia.
7. To describe and recognize etiologies of esotropia.
8. To describe and recognize etiologies of exotropia.

9. To describe and recognize various strabismus patterns (e.g., A or V pattern).
10. To describe and recognize the etiologies of vertical strabismus.
11. To describe and utilize the non-surgical treatment of strabismus and amblyopia (e.g., patching, atropine penalization, Fresnel and grind-in prism therapy).
12. To describe and recognize the different forms of childhood nystagmus (e.g., sensory, motor, congenital, acquired).
13. To describe and recognize retinopathy of prematurity (e.g., stages, treatment indications).
14. To describe and recognize etiologies and types of pediatric cataracts (e.g., congenital, traumatic, hereditary, idiopathic).
15. To describe and recognize less common hereditary or malformative ocular anomalies and syndromes (e.g., Mobius, Goldenhar syndrome).
16. To describe and recognize typical features of retinoblastoma (e.g., differential diagnosis, evaluation, treatment indications).
17. To describe the main features of dyslexia and its relationship to vision.
18. To describe basic evaluation and differential diagnosis of decreased vision in infants and children (e.g., retinal and optic nerve etiologies, amblyopia).
19. To describe recognizable causes of blindness in infants (e.g., albinism, optic nerve hypoplasia, achromatopsia, Leber's congenital amaurosis, retinal dystrophy, congenital optic atrophy).
20. To describe etiology, evaluation, and management of congenital infections (e.g., toxoplasmosis, rubella, cytomegalovirus, syphilis, herpes).
21. To describe and recognize the common causes of pediatric uveitis.

B. Technical skills

1. To perform a more advanced extraocular muscle examination based on knowledge of the anatomy and physiology of ocular motility.
2. To assess more advanced ocular motility problems (e.g., bilateral or multiple cranial neuropathy, myasthenia gravis, thyroid eye disease).
3. To apply Hering's and Sherrington's laws in more advanced cases (e.g., pseudoparesis of the contralateral antagonist, enhancement of ptosis in myasthenia gravis)
4. To perform more advanced measurements of strabismus (e.g., double Maddox rod testing, Lancaster red green testing, synoptophore or amblyoscope).
5. To perform assessment of vision in more difficult strabismus patients (e.g. uncooperative child, mentally impaired, nonverbal or preverbal).
6. To perform basic extraocular muscle surgery
 - a. To exercise surgical judgement for the indications and contraindications for strabismus surgery
 - b. To perform pre-operative assessment, intraoperative techniques and to describe intraoperative and post-operative complications of strabismus surgery
 - c. To perform the following strabismus surgeries
 - 1) Recession
 - 2) Resection
 - 3) Muscle weakening (e.g., tenotomy) and strengthening (e.g., tuck) procedures
 - 4) Transposition
 - 5) Use of adjustable sutures
 - d. To manage the complications of strabismus surgery (e.g., slipped muscle, anterior segment ischemia).

ADVANCED LEVEL GOALS: PGY-4 (in addition to Standard Level goals)

A. Cognitive skills

1. To describe and perform the most advanced strabismus examination techniques (e.g., complicated prism cover testing in multiple cranial neuropathy, patients with nystagmus, dissociated vertical deviation, double Maddox rod testing).
2. To perform the most advanced techniques for assessment of visual development in complicated or non-cooperative pediatric ophthalmology patients (e.g., less common objective measures of visual acuity, electrophysiologic testing).
3. To apply the most advanced knowledge of strabismus anatomy and physiology (e.g., spiral of Tillaux, secondary and tertiary actions, spread of comitance) in evaluation of patients.
4. To describe clinical application of the most advanced sensory adaptations (e.g., anomalous head position, anomalous retinal correspondence).
5. To recognize and treat the most complicated etiologies of amblyopia (e.g., refraction non-compliance, patching failures, pharmacologic penalization).
6. To recognize and treat the most complex etiologies of esotropia (e.g., optical, prism-induced, post-surgical/consecutive).
7. To recognize and treat the most complex etiologies of exotropia (e.g., supranuclear, paralytic pontine exotropia, consecutive).
8. To recognize and treat the most complex strabismus patterns (e.g., aberrant regeneration, post-surgical, thyroid ophthalmopathy and myasthenia gravis).
9. To recognize and treat the most complex etiologies of vertical strabismus (e.g., skew deviation, post-surgical, restrictive).
10. To apply non-surgical treatment (e.g., patching, atropine penalization) of more complicated forms of amblyopia (e.g., non-compliant, patching failures).
11. To recognize, evaluate, and treat the most complex forms of childhood nystagmus (e.g., sensory, spasmus nutans, associated with neurologic or systemic disease).
12. To recognize and treat (or refer for treatment) complex retinopathy of prematurity (e.g., stages, treatment indications, retinal detachment).
13. To recognize and treat (or refer for treatment) uncommon etiologies and types of pediatric cataracts (e.g., congenital, traumatic).
14. To recognize and appropriately evaluate the more complex hereditary ocular syndromes (e.g., bilateral Duane syndrome, Mobius syndrome).
15. To recognize and treat (or refer for treatment) patients with complicated retinoblastoma (e.g., bilateral cases, monocular patient, treatment failure, pineal involvement).
16. To recognize and evaluate the less common congenital ocular anomalies (e.g., unusual genetic syndromes).
17. To apply the most advanced principles of binocular vision and amblyopia (e.g., physiology of binocular vision, diplopia, confusion and suppression, normal and abnormal retinal correspondence, classification and characteristics of amblyopia).
18. To recognize and treat complex pediatric retinal disease (e.g., inherited retinopathies, retinopathy of prematurity).
19. To recognize and treat complex pediatric glaucoma.
20. To recognize and treat complex pediatric cataracts and anterior segment abnormalities (including surgical implications, techniques, and complications).
21. To recognize and treat complex pediatric eyelid disorders (e.g., lid lacerations, lid tumors).
22. To recognize and treat (or refer) pediatric orbital disease (e.g., orbital tumors, orbital fractures, rhabdomyosarcoma, severe congenital orbital malformations).

B. Technical/surgical skills

1. To perform more complex extraocular muscle surgery (e.g., vertical and horizontal muscle surgery; re-operations).

2. To describe indications and contraindications for more complex strabismus surgery.
3. To describe and perform the pre-operative assessment, intraoperative techniques and to describe postoperative complications for more complicated strabismus surgery (e.g., re-operations, slipped muscle).
4. To describe indications for and to perform adjustable sutures in more complicated cases (e.g., thyroid ophthalmopathy).
5. To describe and manage more complex complications of strabismus surgery (e.g., globe perforation, endophthalmitis, overcorrection).

CHAPTER 12. VITREORETINAL DISEASE

BASIC LEVEL: PGY-2

A. Cognitive skills

1. To describe basic principles of retinal anatomy and physiology (layers of the retina, retinal physiology).
2. To describe fundamentals and demonstrate basic understanding of fluorescein angiography as applied to retinal vascular disease (e.g., phases of the angiogram, indications).
3. To describe etiologies and mechanisms of retinal detachment.
4. To describe macular anatomy and function and to describe typical features of common macular disease (e.g., age-related macular degeneration, macular hole, macular dystrophies).
5. To describe basic principles of laser photocoagulation.
6. To describe and recognize features of commotio retinae, traumatic choroidal rupture, and Purtscher's retinopathy.
7. To describe common forms of retinal vascular disease (e.g., branch, hemi- or central retinal vein and artery occlusion).
8. To describe typical features of retinitis pigmentosa.
9. To describe features of, recognize, and evaluate posterior vitreous detachments

B. Technical skills

1. To perform direct ophthalmoscopy.
2. To perform indirect ophthalmoscopy.
3. To perform slit lamp biomicroscopy with the Hruby, +78, +90 lenses, and 3-mirror contact lens.
4. To interpret basic fluorescein angiography in common retinal disorders (e.g., diabetic retinopathy, cystoid macular edema).

STANDARD LEVEL GOALS: PGY-3 (in addition to Basic Level goals)

A. Cognitive skills

1. To describe more advanced retinal anatomy and physiology.
2. To describe more advanced concepts of fluorescein/indocyanine green (ICG) angiography as applied to retinal vascular and other diseases (e.g., phases of the angiogram, indications).
3. To describe principles of retinal detachment recognition, various types of retinal detachment (e.g., exudative, rhegmatogenous, tractional), and their evaluation, management and repair (e.g., identify retinal break).
4. To describe and recognize typical features of less common macular disease (e.g., parafoveal telangiectasias, cone dystrophies, toxic maculopathies).
5. To describe indications for and complications of laser photocoagulation.
6. To describe the findings of major studies in retinal diseases, including the following:
 - a. Diabetic Retinopathy Study (DRS)
 - b. Diabetic Vitrectomy Study (DVS)
 - c. Early Treatment of Diabetic Retinopathy Study (ETDRS)
 - d. Macular Photocoagulation Study (MPS)
 - e. Diabetes Control and Complications Trial (DCCT)
 - f. Branch Vein Occlusion Study (BVOS)
 - g. Central Vein Occlusion Study (CVOS)

- h. United Kingdom Prospective Diabetes Study (UKPDS)
 - i. Age-Related Eye Disease Study (AREDS)
 - j. Verteporfin in Photodynamic Therapy Study (VIP)
 - k. Treatment of Age-Related Macular Degeneration with Photodynamic Therapy Study (TAP)
7. To describe the fundamentals of, evaluate, and treat (or refer) peripheral retinal disease and vitreous pathology (e.g., vitreous hemorrhage, retinal breaks).
 8. To describe, evaluate, and treat choroidal detachments.
 9. To identify and evaluate retinoschisis (e.g., juvenile, senile).
 10. To diagnose, treat, and recognize the complications of retinopathy of prematurity (e.g., retinal detachment).
 11. To diagnose, evaluate, and treat the following retinal vascular diseases
 - a. Arterial and venous obstructions
 - b. Diabetic retinopathy
 - c. Hypertensive retinopathy
 - d. Peripheral retinal vascular occlusive disease
 - e. Acquired retinal vascular diseases
 - f. Ocular ischemic syndrome
 - g. Sickle cell retinopathy
 12. *To describe and recognize common and uncommon macular disorders*
 - a. *Age-related macular degeneration (ARMD)*
 - b. Choroidal neovascularization (e.g., ARMD, histoplasmosis)
 - c. High myopia
 - d. Macular dystrophies
 - e. Macular pucker (e.g., epiretinal membrane)
 - f. Macular holes
 - g. Cystoid macular edema
 - h. Central serous choroidopathy (retinopathy)
 - i. Optic pit and secondary serous detachment
 13. To describe the fundamentals of retinal electrophysiology.
 14. To describe, recognize, and evaluate hereditary retinal and choroidal diseases (e.g., gyrate atrophy, choroideremia, retinitis pigmentosa, cone dystrophies, Stargardt's disease, Best's disease, stationary night blindness).
 15. To recognize, evaluate, and treat (or refer) retinal and choroidal toxicity (e.g., phenothiazine, hydroxychloroquine/chloroquine toxicity, tamoxifen).
 16. To describe the techniques for retinal detachment repair (e.g., pneumatic retinopexy, scleral buckling, vitrectomy).
 17. To describe the basics of surgical vitrectomy (e.g., mechanics, instruments, indications, and technique).
 18. To describe the indications for and perform basic laser treatment for diabetic retinopathy (e.g. pan-retinal photocoagulation; macular grid).
 19. To describe the fundamentals of special vitreoretinal techniques
 - a. Macular hole repair
 - b. Epiretinal membrane peeling
 - c. Complex vitrectomy for proliferative vitreoretinopathy
 - d. Use of heavy liquids and intraocular gases (e.g., perfluorocarbons)
 20. To describe posterior uveitis syndromes and endophthalmitis.

B. Technical skills

1. To perform indirect ophthalmoscopy with scleral indentation.
2. To perform ophthalmoscopic examination with contact lenses, including pan-fundusopic lenses.

3. To interpret fluorescein and ICG angiography.
4. To describe the indications for and interpret retinal imaging technology (e.g., ocular coherence tomography, retinal thickness analysis).
5. To perform posterior segment photocoagulation.
6. To perform diabetic focal/grid macular laser treatment.
7. To perform peripheral scatter photocoagulation (panretinal).
8. To perform laser retinopexy (demarcation) for simple retinal breaks.
9. To describe the indications for and interpret basic electrophysiological tests (e.g., electroretinogram [ERG], electro-oculogram [EOG], visual evoked potential (VEP), dark adaptation).
10. To interpret basic ocular imaging techniques (e.g., B-scan echography, nerve fiber layer analysis).
11. To perform fundus drawings of the retina, showing complex vitreoretinal relationships and findings.
12. To perform cryotherapy of retinal holes and other pathology.
13. To perform scleral buckling.
14. To describe indications, techniques, and complications of pars plana vitrectomy and to assist in a retinal surgery or perform the procedure under supervision.

ADVANCED LEVEL GOALS: PGY-4 (in addition to Standard Level goals)

A. Cognitive skills

1. To apply in clinical practice the most advanced knowledge of retinal anatomy and physiology (e.g., surgical anatomy).
2. To apply in clinical practice the most advanced concepts of fluorescein/ICG angiography in complex retinal vascular and other diseases (e.g., occult choroidal neovascular membranes, recurrent neovascularization, vascular tumors, diseases of choroid and retinal pigment epithelium).
3. To evaluate, treat or refer the most complex retinal detachments (e.g., recurrent retinal detachment, proliferative vitreoretinopathy).
4. To evaluate, treat or refer the most complex macular disease (e.g., recurrent neovascular membranes).
5. To describe the indications for laser photocoagulation, including photodynamic therapy for the most complex retinal pathology (e.g., subfoveal neovascular membranes).
6. To describe the findings of the major studies in retinal diseases and describe the indications and exceptions for application to individual patients
 - a. Diabetic Retinopathy Study (DRS)
 - b. Diabetic Vitrectomy Study (DVS)
 - c. Early Treatment of Diabetic Retinopathy Study (ETDRS)
 - d. Macular Photocoagulation Study (MPS)
 - e. Diabetes Control and Complications Trial (DCCT)
 - f. Branch Vein Occlusion Study (BVOS)
 - g. Central Vein Occlusion Study (CVOS)
 - h. United Kingdom Prospective Diabetes Study (UKPDS)
 - i. Treatment of Age-related Macular Degeneration with Photodynamic Therapy (TAP; VIP)
7. To apply in clinical practice understanding of the most complex peripheral retinal disease and vitreous pathology (e.g., Goldmann-Favre disease, incontinentia pigmenti, familial exudative vitreoretinopathy).
8. To evaluate and treat complications of retinal photocoagulation (e.g., vitreous hemorrhage, chorioretinal anastomoses).
9. To recognize and treat complex retinal detachments (e.g., giant tear).

10. To evaluate, treat or refer the more complex cases of retinopathy of prematurity (e.g., tractional retinal detachment).
11. To evaluate, treat or refer the most complex forms of retinal vascular disease
 - a. Combined arterial and venous obstructions
 - b. Advanced diabetic retinopathy
 - c. Advanced hypertensive retinopathy
 - d. Peripheral retinal vascular occlusive disease
 - e. Acquired retinal vascular diseases
12. To evaluate and treat or refer the uncommon manifestations or presentations of the following macular diseases
 - a. Age-related macular degeneration (ARMD)/choroidal neovascularization, (e.g., recurrent subfoveal neovascularization).
 - b. Uncommon macular dystrophies
 - c. Refractory cystoid macular edema
 - d. Recurrent central serous choroidopathy (retinopathy)
13. To apply in clinical practice the more complex retinal electrophysiology (e.g., multifocal electroretinography).
14. To apply in clinical practice the more complex techniques for retinal detachment repair
 - a. Repeat scleral buckling
 - b. Pars plana vitrectomy (e.g., diagnostic tap; core vitrectomy)
15. To apply in clinical practice the more complex principles of surgical management of diabetic retinopathy (e.g., vitrectomy, membrane release).
16. To apply in clinical practice complex vitreoretinal techniques
 - a. Macular hole repair
 - b. Epiretinal membrane peeling
 - c. Complex vitrectomy for proliferative vitreoretinopathy
 - d. Use of heavy liquids
17. To evaluate and treat or refer the etiologically more complex or uncommon cases of posterior uveitis (e.g., sympathetic ophthalmia) and endophthalmitis (e.g., endogenous).

B. Technical/surgical skills

1. To perform indirect ophthalmoscopy with scleral indentation in complex retinal cases (e.g., multiple holes, documented with retinal drawing).
2. To perform ophthalmoscopic examination with pan-funduscopy or other lenses in complex retinal conditions (e.g., giant retinal tears, proliferative vitreoretinopathy).
3. To interpret and apply in clinical practice the results of fluorescein and ICG angiography in complex retinal or choroidal pathology (e.g., occult subretinal neovascular membrane).
4. To perform posterior segment photocoagulation in more complicated retinal cases
 - a. Diabetic focal/grid macular treatment (e.g., monocular patient, repeat treatment)
 - b. Repeat peripheral scatter photocoagulation (panretinal)
 - c. Laser retinopexy (demarcation) of large breaks; cryotherapy
5. To interpret and apply in clinical practice electrophysiology (e.g., ERG, EOG, VEP, dark adaptation) in more complicated retinal pathology.
6. To interpret and apply in clinical practice ocular imaging techniques (e.g., B-scan echography) in more complex cases (e.g., choroidal osteoma).
7. To perform fundus drawings of the retina with vitreoretinal relationships in the most complex retinal cases (e.g., recurrent retinal detachment, retinoschisis with and without retinal detachment).
8. To perform laser therapy or cryotherapy of retinal holes and other more complex retinal pathology.
9. To perform scleral buckling in complex retinal detachment.
10. To perform advanced pars plana vitrectomy.

CHAPTER 13. UVEITIS

BASIC LEVEL GOALS: PGY-2

A. Cognitive skills

1. To describe basic principles of history taking and examination of patients with uveitis.
2. To list signs and symptoms of anterior and posterior uveitis (e.g., red eye, blurred vision, anterior segment cell and flare, vitreous opacities, pars planitis, retinal or choroidal infiltrates).
3. To describe the different types of uveitis (e.g., acute and chronic uveitis, granulomatous and non-granulomatous uveitis, anterior, intermediate, and posterior uveitis).
4. To describe typical features and differential diagnosis of anterior uveitis, including infectious (e.g., bacterial, viral, protozoal, parasite), inflammatory (e.g., sarcoid, HLA-B27-associated, Behcet's disease, collagen vascular disease), neoplastic (masquerade syndromes), post-surgical, post-traumatic, Fuchs' heterochromic uveitis.
5. To describe typical features and differential diagnosis of the following posterior segment uveitis
 - a. Toxoplasmosis
 - b. Sarcoidosis
 - c. Pars planitis
 - d. Acute retinal necrosis
 - e. Vogt-Koyanagi-Harada syndrome
 - f. Large cell lymphoma
 - g. Post-operative uveitis
 - h. Endophthalmitis (e.g., post-operative, traumatic, endogenous, fungal, phacoanaphylactic, sympathetic ophthalmia)
 - i. Unusual infectious etiologies for uveitis (e.g., human immunodeficiency virus, herpes simplex virus, herpes zoster virus, pneumocystis carinii)
 - j. Acquired and congenital ocular syphilis
 - k. Cytomegalovirus retinitis

B. Technical skills

1. To perform an examination of the anterior and posterior segment for uveitis (e.g., slit lamp biomicroscopy, scleral depression, magnified posterior segment exam, vitreous evaluation for cells, retinal, choroidal, and pars plana evaluations).
2. To describe indications for ancillary testing in the evaluation of uveitis (e.g., fluorescein angiography, ultrasound, laboratory testing, radiologic testing).

STANDARD LEVEL GOALS: PGY-3 (in addition to Basic Level goals)

A. Cognitive skills

1. To describe more advanced principles of history taking and examination of patients with uveitis (e.g., review of systems for Wegener's granulomatosis, polyarteritis nodosa, evaluation of skin, cardiac, respiratory, renal, pulmonary, musculoskeletal systems)
2. To list less common signs and symptoms of anterior and posterior uveitis.
3. To list differentiating signs of less common forms of uveitis (e.g., iris nodules, conjunctival ulcer or granuloma).

4. To describe the differential diagnosis of less common forms of uveitis (e.g., chronic uveitis, intermediate uveitis (e.g., pars planitis), and infectious (e.g., Whipple disease, syphilis) or inflammatory posterior uveitis.

5. To evaluate and treat common causes of anterior and posterior uveitis.

B. Technical skills

1. To perform a directed examination of the anterior and posterior segment for uveitis (e.g., slit lamp biomicroscopy, scleral depression, magnified posterior segment exam, vitreous evaluation for cells).

2. To perform ancillary testing in the evaluation of uveitis (e.g., fluorescein angiography, ultrasound, laboratory testing, radiologic testing).

ADVANCED LEVEL GOALS: PGY-4 (in addition to Standard Level goals)

A. Cognitive skills

1. To recognize, evaluate and treat uveitis associated with immunosuppressed individuals (e.g., active and recovered acquired immune deficiency syndrome, pharmacologic immunosuppression).

2. To recognize, evaluate and treat acquired and congenital ocular syphilis.

3. To recognize, evaluate and treat (or refer) less common, rare, or tropical conditions associated with uveitis (e.g., Leishmaniasis).

4. To describe indications and contraindications for corticosteroid treatment of uveitis (e.g., topical, local, systemic), including risks and benefits of therapy.

5. To describe indications and contraindications for immunosuppressive therapy in uveitis.

B. Technical skills

1. To administer steroids in the treatment of uveitis by various routes.

2. To administer immunosuppressive agents in uveitis (or refer for administration).

3. To evaluate and treat the complications of uveitis therapy (e.g., cataracts, glaucoma).

4. To biopsy, when indicated, the vitreous or uveal tract.

5. To insert intravitreal implants containing antiviral or corticosteroid medications.

6. To perform, when indicated, vitrectomy or scleral buckling procedures.

CHAPTER 14. OCULAR ONCOLOGY

BASIC LEVEL GOALS: PGY-2

A. Cognitive skills

1. To describe the basic categorization of common extra- and intraocular tumors.
2. To describe the differential diagnosis, epidemiology, evaluation, and management of leucocoria (e.g., inflammatory, infectious, neoplastic, congenital, persistent fetal vasculature, cataract, Coats' disease, vitreous hemorrhage, retinal detachment).
3. To describe major diagnostic features of major intraocular tumor types (e.g. retinoblastoma, choroidal melanoma, metastatic lesions) and to describe the differentiating features of similar lesions.

B. Technical skills

1. To perform slit lamp, ophthalmoscopic and ocular transillumination examination of patients with intraocular tumors (e.g., choroidal melanoma).
2. To recognize an ocular tumor and refer appropriately.

STANDARD LEVEL GOALS: PGY-3 (in addition to the Basic Level goals)

A. Cognitive skills

1. To describe management options for different intraocular tumors.
2. To describe the findings of the Collaborative Ocular Melanoma Study (COMS).
3. To describe the classification of retinoblastoma.
4. To describe basic histopathology of intraocular tumors.
5. To list the differential diagnoses for tumors of the iris, ciliary body, choroid, retina and optic disc (e.g. melanoma, retinoblastoma, hemangioma, melanocytoma).
6. To describe diagnostic techniques for common intraocular tumors (e.g., physical examination, imaging, laboratory, oncology referral).
7. To describe the prognostic significance of different types of ocular tumors and to be able to guide evaluation for systemic involvement.

B. Technical skills

1. To perform indirect ophthalmoscopy in the diagnosis and localization of intraocular tumors.
2. To perform transillumination for intraocular tumor.
3. To describe indications for an examination under anesthesia for pediatric intraocular tumors.
4. To describe indications for A- and B-scan echography of intraocular mass lesions.
5. To describe indications for fluorescein angiography of intraocular tumors.
6. To describe indications for destruction or excision of conjunctival, corneal and intraocular tumors.
7. To describe indications for laser photocoagulation for intraocular tumors.
8. To describe indications for and techniques of transpupillary thermal therapy for intraocular tumors.
9. To recognize major histopathologic appearance of common intraocular tumors.
10. To describe the indications for surgical or other therapeutic procedures and their complications, and for referral, if necessary, for:
 - a. Plaque or other radiotherapy
 - b. Iridectomy and iridocyclectomy

c. Resection of conjunctival tumors

11. To perform an enucleation.
12. To describe indications for and techniques and complications of radiation therapy for ocular tumors (e.g., radioactive plaque localization, external beam radiation).
13. To discuss various treatment options with patients and their families in a detailed, ethical, and compassionate manner.

ADVANCED LEVEL GOALS: PGY-4 (in addition to Standard Level goals)

A. Cognitive skills

1. To describe management options for unusual intraocular tumors (e.g. choroidal metastasis, choroidal osteoma).
2. To apply the findings of the Collaborative Ocular Melanoma Study (COMS).
3. To recognize, evaluate, and treat all forms of extra- and intraocular tumors.

B. Technical skills

1. To perform indirect ophthalmoscopy in the diagnosis and localization of intraocular tumors prior to treatment.
2. To describe indications for and to perform an examination under anesthesia for pediatric intraocular tumors (e.g., retinoblastoma).
3. To describe indications for and to interpret A- and B-scan echography of intraocular mass lesions.
4. To describe indications for and to interpret of fluorescein angiography of intraocular tumors.
5. To describe indications for and to perform excision or other treatment of conjunctival, corneal, and intraocular tumors.
6. To describe indications for and to perform laser photocoagulation for intraocular tumors.
7. To recognize major histopathologic appearance of common and less common intraocular tumors.
8. To describe indications for surgical procedures and their complications and be able to perform or to refer for:
 - a. Plaque radiotherapy
 - b. External beam radiotherapy
 - c. Iridectomy and iridocyclectomy
 - d. Resection or cryotherapy of conjunctival tumors, or use of antimetabolite eyedrops
 - e. Transpupillary thermal therapy
9. To perform a complicated enucleation (e.g., complicated by hemorrhaging, small orbit, scar tissue) or exenteration.

CHAPTER 15. LOW VISION REHABILITATION

BASIC LEVEL GOALS: PGY-2

A. Cognitive skills

1. To describe low vision assessment techniques (e.g., Early Treatment of Diabetic Retinopathy Study charts, Sloane charts).
2. To describe significant co-morbidities that impact low vision rehabilitation.
3. To describe various low vision aids.
4. To describe the optics of low vision devices.
5. To be sensitive to psychological and emotional aspects of visual impairment.
6. To describe challenges commonly encountered by individuals with visual impairments.
7. To prescribe simple but appropriate rehabilitative therapies and optical devices to help the patient meet his/her goals. (e.g., magnification, illumination).
8. To describe functional implications of various visual system pathologies and diseases.
9. To describe visual field enhancing techniques for hemianopic field loss.
10. To describe the difference between visual acuity testing at both distance and near and contrast sensitivity testing.
11. To describe the evaluation of and rationale for licensing automobile drivers who are visually impaired.
12. To describe evaluation of visual acuity and visual field for disability determination.

STANDARD LEVEL GOALS: PGY-3 (In addition to Basic Level goals)

A. Cognitive skills

1. To recognize significant co-morbidities that impact low vision rehabilitation.
2. To recognize and describe clinical applications, indications, and limitations of the various low vision aids (e.g., closed circuit television, magnification, large print, Braille, computers with speech).
3. To describe the more advanced optics of low vision devices.

B. Technical skills

1. To prescribe more complex rehabilitative therapies and optical devices to help the patient meet his/her goals.
2. To apply and prescribe visual field enhancing techniques for hemianopic field loss.
3. To perform evaluation of vision assessment in licensing drivers who are visually impaired.
4. To evaluate visual acuity and visual field for disability determination.
5. To demonstrate low vision devices and educate low vision patients on the uses and limitations of these devices.

ADVANCED LEVEL GOALS: PGY-4 (In addition to Standard Level goals)

A. Cognitive skills

1. To treat significant co-morbidities that impact low vision rehabilitation.
2. To describe indications for the most complex low vision aids.
3. To apply more complex principles of optics of low vision devices.

B. Technical skills

1. To prescribe the most complex rehabilitative therapies and optical devices to help the patient meet his/her goals.
2. To apply and prescribe the most complex visual field enhancing techniques for hemianopic field loss.

CHAPTER 16. OPHTHALMIC PRACTICE

BASIC LEVEL GOALS: PGY-2

1. To describe the fundamentals and principles of medical ethics in ophthalmology (e.g., patient care decision-making, informed consent, competency issues, ethics of inter-collegial relations, risk management, privacy issues).
2. To describe the basics of ophthalmic practice management (e.g., contractual negotiations, hiring and supervising employees, financial management, working with associates, billing/collecting).
3. To describe the basics of the health care system and reimbursement, as appropriate to the local, regional, and national market of the trainee (e.g., third party payers, managed care, Medicare (USA), medical documentation, Medicaid (USA), private insurance, nationalized health care systems (UK, Canada, others)).

STANDARD LEVEL GOALS: PGY-3 (in addition to the Basic Level goals)

1. To describe and apply more advanced principles of medical ethics (e.g., life and death patient care decision-making, ethics of optometric and non-physician relations, documentation requirements, claims in risk management).
2. To describe and apply more advanced aspects of practice management (e.g., business models, documentation requirements and coding, privacy requirements, dealing with patients or employees with disabilities).
3. To describe and apply more advanced aspects of health care reimbursement (e.g., physicians' role in managed care organizations, administrative role, third party reimbursement, capitated programs).

ADVANCED LEVEL GOALS: PGY-4 (in addition to Standard Level goals)

1. To demonstrate proficiency in more advanced principles of medical ethics (e.g., informed consent in children, the mentally ill or disabled, or the demented patient; physician and industry; acceptance and disclosure of gifts or consultation fees).
2. To utilize in clinical practice the principles of practice management (e.g., starting a practice, economics of starting a practice, licensing and credentialing applications).
3. To utilize in clinical practice more advanced aspects of health care reimbursement (e.g., denials of claims, hospital contracting, electronic billing).