



**International Ophthalmology  
Strategic Plan to Preserve  
and Restore Vision**

# VISION FOR THE FUTURE

**International Council of Ophthalmology  
Academia Ophthalmologica Internationalis**

*Credits:*

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## PLANNING GROUP

### **International Ophthalmology Strategic Plan to Preserve and Restore Vision — *Vision for the Future***

Coordinators	210
Task Force Members	210
Consultants	211
International Council of Ophthalmology	212
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**Part 1**

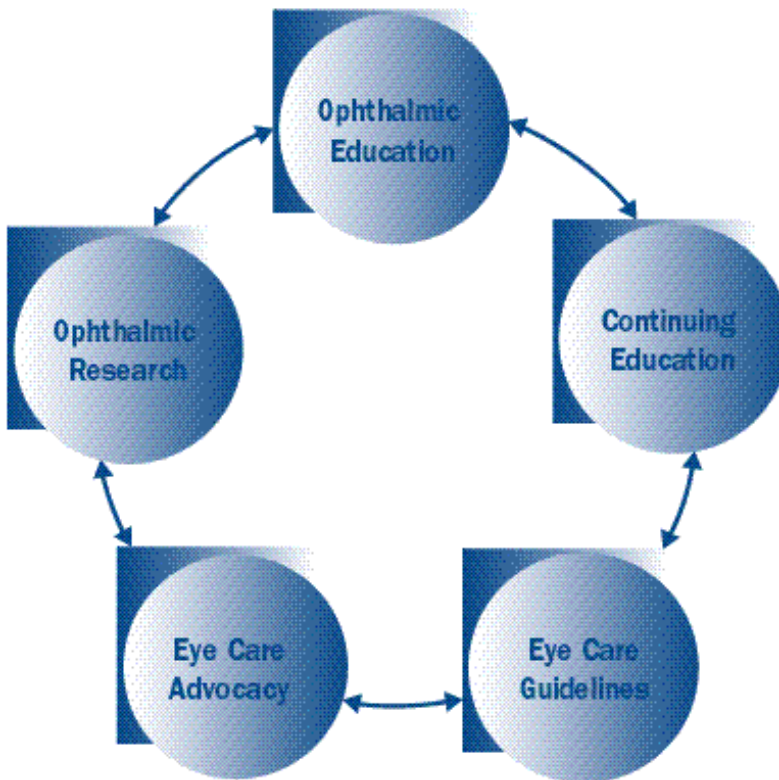
**Mission and Goals**

## *Executive Summary*

1. Worldwide, about 45 million persons are blind and 135 million persons are severely visually impaired. It is estimated that the number of blind and visually impaired will double from 180 million to 360 million persons by 2020 unless concerted action is taken.
2. Much of this visual loss is avoidable with current knowledge and technology. *The International Ophthalmology Strategic Plan to Preserve and Restore Vision—Vision for the Future* is designed to encourage, enhance and coordinate activities of the approximately 150,000 ophthalmologists and the many additional thousands of physicians, health specialists and societal leaders in a sustained program to decrease the toll of blindness and visual impairment throughout the world.
3. The central purpose of *The International Ophthalmology Strategic Plan to Preserve and Restore Vision—Vision for the Future* is to eliminate blindness and severe visual impairment that result from preventable and treatable eye disease for people throughout the world. Participants will work to help assure that all people have 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 worldwide.
4. *The International Ophthalmology Strategic Plan to Preserve and Restore Vision—Vision for the Future* stems from planning sessions organized by the International Council of Ophthalmology and the Academia Ophthalmologica Internationalis in 1999 and 2000. Participants in the Planning Group included members of the International Council of Ophthalmology and the Council Advisory Committee, members of the Academia Ophthalmologica Internationalis, and consultants representing ophthalmologic organizations, non-governmental organizations, governmental entities and the vision care industry.
5. With a mission to preserve and restore vision, *Vision for the Future* encourages activities to enhance Ophthalmic Education and Training, Ophthalmology Continuing Education, Eye Care Guidelines and Recommendations, Advocacy for the Preservation and Restoration of Vision, and Research in Ophthalmology and Vision.

6. Ophthalmic Education and Training are needed to provide ophthalmology education to all medical students, to advance ophthalmology resident physician training, and to enhance the training of allied ophthalmic personnel.
7. Ophthalmology Continuing Education extends throughout the career of the ophthalmologist and encompasses development and dissemination of educational programs so that all ophthalmologists can obtain and progressively increase personal knowledge and skills.
8. Eye Care Guidelines and Recommendations define appropriate eye care and encourage a universal high standard of eye care quality.
9. Advocacy for the Preservation and Restoration of Vision acts to increase public awareness of blindness prevention and to augment support for *Vision for the Future* by ophthalmologic organizations, non-governmental entities, governments and the public at large.
10. Research in Ophthalmology and Vision encompasses basic science investigation and clinical research focused on meeting global needs for eye care. Research is essential for development of new and improved therapy for blinding and sight impairing eye disease.
11. Implementation of *Vision for the Future* is directed and coordinated by the International Council of Ophthalmology, the executive body of the International Federation of Ophthalmological Societies. The International Council of Ophthalmology includes elected members and representatives of the Academia Ophthalmologica Internationalis, multinational ophthalmology organizations and international non-governmental organizations devoted to blindness prevention.
12. *The International Ophthalmology Strategic Plan to Preserve and Restore Vision—Vision for the Future* is a multi-year, flexible and interactive program. Flexible in that a continuing process of review, modification and updating is planned. Interactive in that *Vision for the Future* envisions partnerships with the Global Initiative for the Elimination of Avoidable Blindness/Vision 2020 and other global, national and institutional programs sponsored by organizations and entities committed to the elimination of avoidable blindness.

## VISION FOR THE FUTURE



*To Preserve and Restore Sight...*

## *Introduction to Part 1*

Worldwide, about 45 million persons are blind and 135 million persons are visually impaired—impaired so severely that they cannot read newsprint with either eye even with best possible eyeglasses.<sup>1</sup> Even more compelling, it is estimated that the number of blind and visually impaired will double, rising from 180 million to 360 million persons by 2020, unless concerted action is undertaken to stem this toll.

Much of this vision loss is avoidable—either preventable or treatable—with currently available knowledge and technology. Therefore, *The International Ophthalmology Strategic Plan to Preserve and Restore Vision—Vision for the Future* is designed to encourage, enhance and coordinate activities of the approximately 150,000 ophthalmologists worldwide and the many additional thousands of physicians, health specialists and societal leaders in a sustained program to decrease blindness and visual impairment throughout the world.

Nearly two-thirds of global blindness and visual impairment is in the developing world, but programs to preserve and restore vision can be improved in every continent and in every country. Thus, *The International Ophthalmology Strategic Plan to Preserve and Restore Vision—Vision for the Future* is a worldwide initiative to promote the best possible vision for every person.

*Vision for the Future* identifies worldwide goals and objectives of ophthalmology and eye care, outlines strategic directions for cooperation and coordination among ophthalmologic organizations and other entities, and focuses on activities by ophthalmologists and ophthalmologic organizations that are most appropriate to the preservation and restoration of vision.

*Vision for the Future* stems from a planning session, organized by the International Council of Ophthalmology and the Academia Ophthalmologica Internationalis in Egypt, on February 24–27, 1999. Participants included members of both organizations, members of the Advisory Committee of the International Council of Ophthalmology, and other individuals invited as consultants. At a second meeting in Orlando,

Florida, on October 23, 1999, the Strategic Plan was discussed and revised with additional consultants. Results of that Planning Meeting and intervening actions by consultants were further assessed during Strategic Plan meetings in Jerusalem, Israel, on May 20, 2000 and in Dallas, Texas, on October 21, 2000.


*Vision for the Future* is a multi-year activity directed and coordinated by the International Council of Ophthalmology, the executive body of the International Federation of Ophthalmological Societies. The International Council of Ophthalmology includes elected members and representatives of the Academia Ophthalmologica Internationalis, multinational ophthalmology organizations, and international non-governmental organizations.

*The International Ophthalmology Strategic Plan to Preserve and Restore Vision—Vision for the Future* is projected as a multi-year, flexible and interactive program. Flexible in that the program will undergo a continuing process of review, modification and updating. Interactive in that *Vision for the Future* envisions partnerships with global, national and institutional programs sponsored by organizations and entities committed to the elimination of avoidable blindness.

To facilitate this essential evolution and advancement, *Vision for the Future*, Part 1, presents the principal international ophthalmology goals. *Vision for the Future*, Part 2, presents policy and information statements that are particularly likely to undergo advancement that reflects experience, scientific progress and environmental change relevant to worldwide preservation and restoration of vision.

*Reference:*

1. Global Initiative For The Elimination of Avoidable Blindness.  
World Health Organization/PBL/97.61



## *Mission*

*The central mission of The International Ophthalmology Strategic Plan to Preserve and Restore Vision—Vision for the Future is to eliminate blindness and severe visual impairment that result from preventable and treatable eye disease for people throughout the world. International ophthalmology and the entities and individuals participating in Vision for the Future will work to help assure that all people 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 appropriate eye care to people worldwide.*

## PRIMARY STRATEGIC DIRECTIONS

*The International Ophthalmology Strategic Plan to Preserve and Restore Vision—Vision for the Future* recognizes the importance of international cooperation and coordination among individuals and organizations with similar goals of vision preservation and blindness prevention. To fulfill its mission, international ophthalmology will:

- s Encourage all ophthalmologists to devote a portion of their energy and resources to eliminating preventable vision loss and blindness throughout the world.
- s Stimulate an increased commitment to the preservation and restoration of vision and prevention of blindness among all national and supranational ophthalmologic organizations and all specialty ophthalmologic organizations.
- s Work with the World Health Organization (WHO) and International Agency for the Prevention of Blindness (IAPB) to encourage actions by ophthalmologists and ophthalmologic organizations in support of the Global Initiative for the Elimination of Avoidable Blindness/Vision 2020.
- s Demonstrate the personal and economic benefits of ophthalmologic care and of programs to preserve and restore vision to the public at large, to governmental officials and to other authorities in an effort to encourage allocation of the resources necessary for the eradication of avoidable blindness.
- s Support basic science and clinical research in ophthalmology and vision. Of particular merit is research focused on meeting the need for increasingly effective prevention and treatment of eye disease and vision loss.
- s Promote flexibility to incorporate experience derived from special circumstances that vary throughout the world, scientific advances and environmental changes relevant to worldwide preservation and restoration of vision.

## INTERNATIONAL OPHTHALMOLOGY GOALS

To achieve the mission, goals of *The International Ophthalmology Strategic Plan to Preserve and Restore Vision—Vision for the Future* encompass the following major areas of activity:

### OPHTHALMIC EDUCATION AND TRAINING

Ophthalmic education and training, including regular assessment of knowledge, are needed to provide ophthalmology education to all medical students, to progressively advance ophthalmology resident physician training programs and to enhance the training for allied ophthalmic personnel. These activities are central to enabling all people worldwide 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 programs and materials so that all ophthalmologists can obtain and progressively enhance personal knowledge and skills needed to provide the best possible eye care to members of the public.

### EYE CARE GUIDELINES AND RECOMMENDATIONS

Eye care guidelines and recommendations are presented to disseminate information that defines appropriate eye care and encourages activities to achieve a universal, high standard of quality for ophthalmic 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 prevention and to augment the allocation of resources necessary for the eradication of preventable blindness. Advocacy encourages ophthalmologic organizations, non-governmental entities and governments to aid the Global Initiative for the Elimination of Avoidable Blindness/Vision 2020 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.

# OPHTHALMIC EDUCATION AND TRAINING

## OPHTHALMIC EDUCATION AND TRAINING GOAL

Ophthalmic education and training are cornerstones of *Vision for the Future*. Ophthalmic education and training, including regular assessment of knowledge, are needed to provide ophthalmology education to all medical students, to progressively advance ophthalmology resident physician training programs and to enhance the training for allied ophthalmic personnel. These activities are central to enabling all people worldwide to have access to quality eye care.

### **Medical Student Education**

#### OBJECTIVES

Ophthalmology education of all medical students should include at least the knowledge and skills needed to provide an appropriate level of primary eye care and to recognize the indications and needs for referral for specialty ophthalmology management. Education should also include a basic understanding of the anatomy and function of the eye and visual system and of the frequent causes of preventable blindness in the student's geographic region as well as the appropriate means for treatment of these causes. In addition, education should include knowledge regarding the ophthalmic manifestations of systemic disease such as hypertension, neurological disease and metabolic disease; and information regarding diagnosis and treatment of major ophthalmic diseases such as amblyopia, strabismus, cataract, glaucoma, age-related macular degeneration, and trachoma.

#### RESULTS

Results to be obtained in regard to medical student education include:

1. Development and dissemination of an evidence-based ophthalmology curriculum for medical students, including assessment of knowledge, that defines the knowledge and skills that should be incorporated in the curriculum for all medical students.

2. Development and dissemination of variations in the ophthalmology curriculum for medical students that reflect the specific knowledge and skills needed in diverse geographic regions of the world.
3. Distribution of high-quality teaching materials to medical schools worldwide.
4. Utilization of the World Wide Web for dissemination of medical student ophthalmology education objectives and materials.

### **Task Force Action Plan**

The Medical Student Education Task Force is deeply concerned about ophthalmology teaching programs to medical students worldwide. Due to the continuing aging of the world population in the 21st century, increasing longevity of human life worldwide, and increasing prevalence of eye diseases such as cataract, glaucoma and age-related macular degeneration, eye care is an increasingly important part of general medical care.

Of particular importance, education should include basic understanding of the frequent causes of preventable blindness in the geographic region of the medical student and the appropriate means of treatment for these conditions.

Ophthalmic manifestations of systemic diseases are common and increasing in prevalence. These relate to medical, neurological and metabolic diseases. An appropriate ophthalmic education for all students is part of the complete education of the modern physician. Accordingly, the Medical Student Education Task Force plans include:

1. Formation of a policy statement regarding medical student education to identify the contributions of ophthalmology to general medicine (e.g., ophthalmic photocoagulation to laser medicine), emphasize the interactions of ophthalmology and general medicine (e.g., neuro-ophthalmology and neurology) and promote ophthalmology education for all medical students.
2. Development of an evidence-based ophthalmology curriculum, including procedures for assessment of knowledge, for medical students.
3. Recommendations regarding the role of ophthalmologists within medical school faculties.

4. Encouragement for the distribution of medical student educational materials of high quality.
5. Utilization of the World Wide Web for transmitting medical student education information.

### **Ophthalmology Resident and Specialist Physician Education and Training**

#### OBJECTIVES

Ophthalmology resident and specialist education and training objectives are to instill the knowledge, skills and professional values that qualify a physician for the prevention, diagnosis, medical care, surgical management and rehabilitation of eye and visual system disease. Essential elements relate to systemic medical disease; the ophthalmic manifestations of systemic disease such as hypertension, metabolic disease (e.g., diabetes mellitus) and neurologic disease; eye diseases including amblyopia, strabismus, cataract, glaucoma, diabetic retinopathy, age-related macular degeneration, uveitis, infectious and non-infectious inflammatory disease; genetic and degenerative eye disease; injuries to the eye and visual system; and refractive disorders. Essential components of ophthalmology education and training are regular assessment of knowledge, extensive interaction with and supervision by experienced ophthalmologists, interactions with physicians engaged in other aspects of medicine and professional associations with allied ophthalmic personnel.

#### RESULTS

Results to be obtained by ophthalmology resident and specialist physician education activities include:

1. Development and dissemination of a universally applicable curriculum for education and training of ophthalmologists. This curriculum must be broad and flexible in recognition of the differences among population groups, disease prevalence rates, socioeconomic factors and environmental considerations related to health care delivery throughout the world.
2. Development of a model for teaching ophthalmic surgery and evaluating ophthalmic surgery skills including the preoperative evaluation and postoperative care of patients.

3. Utilization by all ophthalmology resident physicians and training programs of an objective system for assessing knowledge during education. If a validated assessment program is not otherwise available, the International Council of Ophthalmology Assessments for Ophthalmologists (the Basic Science Assessment and the Clinical Sciences Assessment) should be utilized.

### **Task Force Action Plans**

The Ophthalmology Resident and Specialist Physician Training and Education Task Force recognizes that there are at least 45 million blind people worldwide and an additional 135 million visually handicapped people throughout the globe. Accordingly, the need for ophthalmologists with a high level of education and training is of critical importance, particularly in some developing countries in which an adequate number of skilled professionals is not currently available. The Task Force will focus on the curriculum that is universally applicable to ophthalmology resident physicians, while recognizing the great variations in social and economic status throughout regions of the world and the urgent need to eliminate avoidable blindness. With this perspective, the Task Force anticipates a spectrum of ophthalmology resident physician training requirements that will be applicable to the various regions of the world. Specific actions planned by the Task Force include:

1. Review of ophthalmology resident physician training curricula from different continents and nations to develop a core curriculum universally applicable for ophthalmology resident physician training worldwide. This will be flexible and incorporate a spectrum of training that will vary in duration and content to facilitate application in regions with diverse disease prevalence, social organization and economic status.
2. Develop a model for teaching ophthalmic surgery and evaluating surgical skills that incorporates preoperative evaluation and postoperative care of patients.
3. Encourage organizations and publishers to distribute educational materials to ophthalmologists in training and to ophthalmology resident physician programs worldwide.

4. Encourage support for equipment needed to train ophthalmology resident physicians in approved resident physician programs, particularly in the use of technology for the advance of ophthalmic care standards worldwide.
5. Stimulate use of the International Council of Ophthalmology basic science and clinical sciences assessment programs by ophthalmology residents and ophthalmology resident training programs, especially in countries and programs that do not have an alternate objective assessment program at this time.
6. Promote commitment to the Global Initiative for the Elimination of Avoidable Blindness/Vision 2020 and the twinning of ophthalmology educational centers in developed and developing countries to accelerate the advance of ophthalmic training worldwide.

### **Allied Ophthalmic Personnel Training**

#### OBJECTIVES

Training programs for allied ophthalmic personnel are designed to provide professional personnel with various qualifications and skills to form a competent and efficient system for eye care delivery. This system for eye care delivery will differ substantially in the various regions and countries of the world.

#### RESULTS

Results to be obtained in the area of allied ophthalmic personnel training include:

1. Preparation of a statement that identifies principles inherent in the education of allied ophthalmic personnel.
2. Development and dissemination of model curricula for ophthalmic allied professional personnel. This recognizes the need for a series of specific curriculum programs that relate to the various levels of allied ophthalmic personnel education and training. At the optometric level, this warrants coordination with optometric training specialists. In similar manner, educators with knowledge and experience related to training and assessment of ophthalmic technologists, orthoptists, ophthalmic assistants and other allied ophthalmic personnel should be consulted.

3. The education and training of allied ophthalmic personnel vary substantially in different geographic regions and countries. Training programs and utilization of allied ophthalmic personnel worldwide must recognize these differences in education, training, professional experience, and licensure.
4. For various categories of allied ophthalmic personnel, curricula should be coordinated with objective knowledge evaluations and skill assessment procedures to promote high-quality allied ophthalmic personnel throughout the eye care delivery system.

### **Task Force Action Plans**

The Allied Ophthalmic Personnel Training Task Force realizes the great need for and service provided by allied ophthalmic personnel in the delivery of quality eye care services worldwide. Since the training of ophthalmology physician specialists requires many years, allied ophthalmic personnel, trained in the performance of specialized tasks, are needed to meet the urgent requirements of eye care services to the millions of blind and visually handicapped people worldwide.

The Task Force recommends that all allied ophthalmic personnel, including optometrists, ophthalmic technologists, orthoptists, ophthalmic assistants and other ophthalmic allied professional specialists, participate at an optimal level of skill to provide a unified and coordinated program for delivery of eye care services. By a unified and coordinated training system, eye care that requires various levels of knowledge and skill can be provided.

The Task Force on Allied Ophthalmic Personnel Training appreciates the need for allied ophthalmic personnel and the diversity of allied ophthalmic personnel programs and utilization patterns. Accordingly, the Task Force plans to:

1. Prepare a policy statement that reflects the principles of an educational system for allied ophthalmic personnel.
2. Assemble and develop model allied ophthalmic personnel curricula for various categories of allied ophthalmic personnel. These curricula are expected to incorporate a spectrum of training, in terms of duration and content, to reflect the needs and practices of diverse regions and countries worldwide.
3. Utilize the World Wide Web to distribute information regarding allied ophthalmic personnel training.

## OPHTHALMOLOGY CONTINUING EDUCATION

### OPHTHALMOLOGY CONTINUING EDUCATION GOAL

Ophthalmology continuing education extends throughout the career of an ophthalmologist and encompasses the development and dissemination of educational programs and materials so that all ophthalmologists can obtain and progressively enhance personal knowledge and skills needed to provide the best possible eye care to members of the public.

#### **Objectives**

The objective of ophthalmology continuing education is to maintain and enhance a universal high level of ophthalmology specialist knowledge and skills. This entails a career-long commitment to education and the advancement of knowledge, skills, and effectiveness in ophthalmic practice throughout a professional career.

#### **Results**

Results to be obtained from ophthalmology continuing education include:

1. Promotion of a commitment by ophthalmologists to continuing education as an essential part of career-long ophthalmic specialty practice.
2. Encouragement for continuing, career-long advance in knowledge and skills, particularly in the area of ophthalmology professional practice.
3. Identification of high-quality continuing education programs and materials for use by ophthalmologists worldwide.
4. Identification of high-quality continuing education programs and materials for use by ophthalmologists engaged in specialized areas of ophthalmic professional practice.
5. Encouragement for assessment of professional knowledge and skill by periodic objective knowledge assessment procedures and regular outcome assessment programs.

### **Task Force Action Plans**

The Ophthalmology Continuing Education Task Force plans to:

1. Motivate ophthalmologists to recognize a commitment to sustain and enhance knowledge and skills through a process of career-long continuing education. This process may be achieved by general policy statements endorsed by national and supranational ophthalmology organizations as well as specialty ophthalmology organizations.
2. Review existing programs of continuing education and recommend a curriculum appropriate for ophthalmology specialists worldwide. This curriculum should promote a steadily higher standard of knowledge and skills among ophthalmologists. A ladder of programs with increasing requirements warrants consideration as a means of encouraging progressively higher standards of ophthalmic professional care worldwide.
3. Identify and promote continuing education programs appropriate for various geographic regions as well as various specialty practices within ophthalmology.
4. Identify and encourage the use of objective knowledge assessment materials to evaluate personal knowledge.
5. Identify and promote the use of objective outcome assessment procedures to evaluate the medical and surgical care of ophthalmic diseases. Programs pertaining to surgical care should include assessment of preoperative status, postoperative status and improvement of quality of life obtained by ophthalmic care.
6. Encourage organizations to distribute educational materials in a manner that makes these affordable and accessible to ophthalmologists worldwide.
7. Encourage qualified ophthalmology specialists to go to developing countries and participate in the training of ophthalmologists.
8. Encourage twinning of national ophthalmology societies and encourage sustained interaction between national ophthalmology societies and specialty ophthalmology organizations. This twinning is for the purpose of propagating ophthalmic knowledge and skills among and within nations.

## *Mission and Goals*

9. Encourage twinning between ophthalmology training programs in developed countries and ophthalmology training programs in developing nations. An outcome of this twinning should be the continuing education of ophthalmologists in the developing countries.
10. Utilize the World Wide Web as a means for dissemination of information regarding ophthalmology continuing education.

# EYE CARE GUIDELINES AND RECOMMENDATIONS

## EYE CARE GUIDELINES AND RECOMMENDATIONS GOAL

Eye care guidelines and recommendations are presented to disseminate information that defines appropriate eye care and encourages activities to achieve a universal high standard of quality for ophthalmic professional services.

### **Objectives**

Eye care guidelines and recommendations are presented to aid ophthalmologists and ophthalmic care facilities to identify appropriate eye care and encourage attainment of progressively higher standards of eye care quality worldwide. Objectives are designed to:

1. Promote access to affordable, quality eye care for all people worldwide.
2. Promote appropriate standards of eye care delivery throughout the world.

### **Results**

Eye care guidelines and recommendations recognize the advance of ophthalmic science and technology that is responsible for a steadily higher standard of eye care expectations and results. Guidelines and recommendations are intended to:

1. Encourage provisions for all people to have access to affordable, quality eye care.
2. Publicize eye care guidelines and standards that are generally applicable.
3. Stimulate ophthalmologists and eye care facilities to attain a progressively higher standard of eye care services to preserve vision and prevent avoidable blindness.

**Task Force Action Plans**

To encourage appropriate eye care worldwide, the Task Force is undertaking actions to:

1. Stimulate arrangements for universal access to affordable quality eye care. This encompasses prevention, screening, medical care and surgical care to preserve and restore vision.
2. Present guidelines and recommendations that recognize that appropriate eye care varies throughout the world in relationship to disease prevalence, population groups, patient expectations and available resources. Policy statements are designed to encourage a progressively higher standard of eye care as ophthalmic science and technology advance.
3. Encourage ophthalmology resident physician training and continuing education programs to enable ophthalmologists to attain appropriate standards and progressively higher levels of eye care services to patients.
4. Present eye care guidelines and recommendations.

## ADVOCACY FOR THE PRESERVATION AND RESTORATION OF VISION

### ADVOCACY FOR THE PRESERVATION AND RESTORATION OF VISION GOAL

Advocacy for the preservation and restoration of vision acts to increase the allocation of resources necessary for the eradication of preventable blindness. Advocacy encourages ophthalmologic organizations, non-governmental entities and governments to aid the Global Initiative for the Elimination of Avoidable Blindness/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. International ophthalmology should coordinate with national and international ophthalmologic organizations, specialty ophthalmologic organizations, non-governmental entities and governments to support the World Health Organization/International Agency for the Prevention of Blindness Global Initiative for the Elimination of Avoidable Blindness/Vision 2020 as well as additional programs to preserve vision and prevent blindness.

#### **Results**

Results to be obtained by preservation and restoration of vision advocacy include:

1. Increased awareness of worldwide visual disability and blindness among ophthalmologists, governments, international organizations and the public.
2. Enhanced awareness by governments of the need for public services and programs to preserve vision and prevent blindness as an important priority on the national health agenda.
3. Encouragement for equitable distribution and efficient utilization of existing resources for restoration of vision and blindness prevention.

4. Increased support from governments and other decision makers for initiatives to prevent visual disability and blindness.
5. Support for the overriding goal of ensuring that all people have access to affordable, quality eye care.
6. Support of specific programs for early intervention and timely care of children with eye disease and potentially blinding conditions.
7. Promotion for quality services to individuals with diseases such as cataract, glaucoma, diabetic retinopathy, age-related macular degeneration, as well as developmental and degenerative eye disease.
8. Awareness of the need to prevent eye injuries.
9. Encouragement for services and rehabilitation programs to enhance quality of life for people with visual disability and blindness.

### **Task Force Action Plans**

The Advocacy for Preservation and Restoration of Vision Task Force plans the following actions:

#### **1. Ophthalmologic Awareness and Commitment**

To conduct a campaign to make every national and supranational ophthalmologic organization, subspecialty society and individual ophthalmologist around the world both aware of public need related to visual disability and blindness and committed to helping address this need in some fashion.

#### **2. National Statistics and Priorities**

To persuade national governments to make preservation and restoration of vision a high priority on the national health care agenda and to include the number of people with visual disabilities and blindness in the principal health statistics compiled by the World Health Organization and by each country.

#### **3. Economic Benefit**

To collect and analyze relevant data to convince the news media and governmental officials of the economic benefit of ophthalmologic care to prevent visual disability and blindness.

**4. Alliance**

To develop a close working relationship with the World Health Organization, International Agency for Prevention of Blindness and non-governmental organizations and collaborate with them to persuade national governments to support efforts to eradicate avoidable blindness and to both preserve and restore vision.

**5. Vision 2020**

To work with national and supranational ophthalmologic organizations in each World Health Organization and International Agency for Prevention of Blindness region to motivate and mobilize ophthalmologists and health care personnel to participate in the Global Initiative for the Elimination of Avoidable Blindness/Vision 2020.

**6. Screening Programs**

To work with ophthalmologic societies, non-governmental organizations and others to establish programs 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 Programs**

To coordinate with ophthalmologic societies, non-governmental organizations and others to establish appropriate programs for treatment of amblyopia, strabismus, cataract, glaucoma, diabetic retinopathy, age-related macular degeneration, trachoma and other eye diseases.

## RESEARCH IN OPHTHALMOLOGY AND VISION

### RESEARCH IN OPTHALMOLOGY AND VISION GOAL

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 effective new therapy for conditions that are now without effective treatment.

#### **Objectives**

The objectives of research in ophthalmology and vision are to encourage and promote basic science and clinical research directed to an increased understanding of the eye and vision, development of procedures for prevention, early diagnosis and treatment of abnormalities and diseases affecting the visual process and scientific studies leading to new treatments for conditions that currently are without effective prevention or treatment. Research in ophthalmology and vision is proposed to:

1. Advance basic science and clinical ophthalmology information to enable increasingly effective prevention, early diagnosis and treatment of eye and visual system disease.

#### **Results**

Research in ophthalmology and vision is proposed to:

1. Increase the number and range of scientific studies, particularly studies related to the delivery of eye care worldwide.
2. Promote and encourage research directed to development of new procedures for prevention and treatment of diseases that are currently without an effective treatment.
3. Emphasize research related to worldwide eye care problems and needs.

**Task Force Action Plans**

To stimulate research in ophthalmology and vision, the Research in Ophthalmology and Vision Task Force plans to:

1. Use data from epidemiological studies and economic analyses to document the need for and outcomes of eye care.
2. Develop and disseminate policy statements to encourage the support of research in vision and ophthalmology by scientific organizations, non-governmental public entities and governmental agencies.
3. Present an eye care research policy statement.



**Part 2**

**Policy and  
Information Statements**

## *Introduction to Part 2*

**T**he *International Ophthalmology Strategic Plan to Preserve and Restore Vision—Vision for the Future* documents the toll of blindness and severe visual impairment worldwide, identifies the major program goals, outlines the strategic directions for cooperation and coordination, and focuses on activities by ophthalmologists, ophthalmologic organizations and allied ophthalmic personnel that are most appropriate to the preservation and restoration of vision for people throughout the world.

In Part 1 of the Plan, the Mission, Primary Strategic Directions and Goals are presented. Principal goals relate to Ophthalmic Education and Training, Ophthalmology Continuing Education, Eye Care Guidelines and Recommendations, Advocacy for the Preservation and Restoration of Vision, and Research in Ophthalmology and Vision.

Part 2 of *The International Ophthalmology Strategic Plan to Preserve and Restore Vision—Vision for the Future* incorporates policy and information statements relevant to each of the five major goals. These are products of individuals, task forces and committees. Therefore, authorship and date are associated with each statement.

*The International Ophthalmology Strategic Plan to Preserve and Restore Vision—Vision for the Future* is a multi-year program that is flexible and interactive. Flexible in that it is pliant in response to the continuing process of review, modification and updating that is planned. Interactive in that it functions through partnerships with global, national and institutional programs sponsored by organizations and entities committed to the elimination of avoidable blindness.

# OPHTHALMIC EDUCATION AND TRAINING

Mark O. M.Tso, M.D., Goal Chairman

Bradley R. Straatsma, M.D., Goal Co-Chairman

## TASK FORCE ON MEDICAL SCHOOL CURRICULUM

Gerhard Lang, M.D. and Yasuo Tano, M.D.

The International Council of Ophthalmology and the Academia Ophthalmologica Internationalis are deeply concerned about ophthalmology teaching programs to medical students worldwide, and therefore establish a Task Force on Medical School Curriculum as a part of *The International Ophthalmology Strategic Plan to Preserve and Restore Vision—Vision for the Future*. After deliberation, the Task Force concluded that:

1. Due to the continuous aging of the world population in the 21st century, increasing longevity of human life worldwide, and eye diseases such as cataract, age-related macular degeneration, glaucoma, etc., being part of the aging process, eye care becomes increasingly important in the general practice of medicine.
2. As the economic conditions of the countries of the world improve, quality of life becomes increasingly important to all people, and vision is one of the most vital functions for the enjoyment of life.
3. We believe that primary eye care, including the recognition of eye disease, should be the responsibility of family physicians.
4. Ophthalmic manifestations of systemic disease are commonly seen in association with medical, neurological and metabolic diseases. A solid education in ophthalmology is part of a complete education of the modern physician.
5. As a result, the Task Force on Medical School Curriculum recommends that the education program of all medical students include:

- § A basic understanding of the anatomy and functions of the eye and visual system;
- § Knowledge regarding the ophthalmic manifestations of systemic disease such as hypertension, neurological disease and medical disease;
- § Information regarding diagnosis and treatment of major ophthalmic diseases such as amblyopia, strabismus, cataract, glaucoma, and age-related macular degeneration, and information regarding diagnosis and treatment of major causes of blindness and visual disability in the geographic area of the medical student.

The curriculum for all medical students should include an objective assessment of knowledge and skills and enable the medical school graduate to provide an appropriate level of primary eye care and to recognize the indications and needs for referral to specialty ophthalmology management.

*June 30, 2000*

# TASK FORCE ON OPHTHALMOLOGY RESIDENT AND SPECIALIST TRAINING IN OPHTHALMOLOGY

**Ronald E. Smith, M.D.**

The Task Force on Ophthalmology Resident and Specialist Training in Ophthalmology of *The International Ophthalmology Strategic Plan to Preserve and Restore Vision—Vision for the Future*, appointed by the International Council of Ophthalmology and Academia Ophthalmologica Internationalis, recognizes that there are 45 million blind people worldwide with an additional 135 million visually handicapped. The need for eye care specialists, especially in some developing countries, is critical.

The task force is focused on the training curricula required to educate specialists in ophthalmology, while recognizing the great variations in social and economic status of regions of the world, and the urgency of the need to eliminate avoidable blindness. The task force will develop general principles and guidelines for the education of the ophthalmologists.

The task force recommends a spectrum of training requirements, depending on geographic locations, for different regions of the world. Furthermore, the necessity for ophthalmic surgeons may be so urgent in certain regions that an ophthalmic surgeon may be trained in an expedited fashion. Accordingly, the task force is reviewing training curricula from different continents and different geographic locations and will recommend to the International Council of Ophthalmology the educational requirements for training of specialists in ophthalmology.

*July 7, 2000*

## OPHTHALMOLOGY RESIDENT AND SPECIALIST TRAINING IN OPHTHALMOLOGY

**Ronald E. Smith, M.D.**

An ophthalmologist is a physician (medical doctor) with additional specialized training, qualifications, and skills in the diagnosis, medical and surgical management of disorders of the eye and visual system; in the prevention of blindness; in the promotion of eye health in individuals and in the community; and in the rehabilitation of patients with visual disability.

Ophthalmologists have a unique role in society as the professionals with a distinct body of knowledge, skills, and attitudes dedicated to maintenance and improvement of eye health. The education and training of physicians who choose ophthalmology as a profession is therefore of critical importance.

This Task Force report summarizes the status of ophthalmology resident education worldwide and suggests principles and guidelines for the education and training of ophthalmologists.

The Task Force on Specialist Education, appointed by the International Council of Ophthalmology and Academia Ophthalmologica Internationalis, recognizes that there are 45 million blind people worldwide with an additional 135 million visually handicapped. The need for eye care specialists, especially in some developing countries, is clearly critical. The Task Force will continue to collect and analyze curricula used to educate specialists in ophthalmology, recognizing the great variations in social and economic status of regions of the world, and the urgency of the need to eliminate avoidable blindness.

### CHARGE TO TASK FORCE ON SPECIALIST EDUCATION

The Task Force was charged to suggest general principles and guidelines for the education of ophthalmologists. The Task Force recommends that a spectrum of training requirements, depending on geographic location, be considered for different regions of the world. Furthermore, the

necessity for ophthalmic surgeons may be so urgent in certain regions that an ophthalmic surgeon may need to be taught in an expedited fashion.

Numerous training programs from around the world responded to the request for curricula. These form the database for the current draft report for review by the International Council of Ophthalmology. The Task Force is grateful to the countries and individual ophthalmologists contributing information and data to this process. The collection and analysis continues. We are also grateful for the permission to reproduce specific language that best captures the principles, guidelines and curriculum details that form the substance of this report. Some of the language in this report is reproduced verbatim from such documents as received from around the world.

#### GENERAL PRINCIPLES AND GUIDELINES OF OPHTHALMOLOGY SPECIALIST TRAINING

The proposed guidelines suggest the basis for the development of a curriculum for ophthalmology residency training in any country or region. These guidelines are not fixed or set in stone and should not be viewed as rigid or mandatory.

Resident learning and development should be provided through a combination of lectures, supervised patient care, graduated hands-on procedural and surgical experience, research and independent study. The focus should not only be on acquisition of knowledge and skills related to ophthalmology itself, 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 three to five years in length, depending on the individual country or region. These guidelines are inclusive of both didactic knowledge acquisition and acquired skills transfer and are set forth in broad terms and by subspecialty.

The goal of a curriculum developed based on these guidelines is to train an ophthalmologist who is capable of providing modern comprehensive ophthalmologic care. The training program should also prepare the graduating ophthalmologist for an examination process which will test, to the extent possible, the graduate's competence and aptitude for practice as an ophthalmologist. The public, government agencies, and

our specialty's long-standing commitment to continuous improvement and excellence demand such demonstration of competence upon completion of the resident education experience.

## OBJECTIVES

The curriculum should provide the following educational experiences:

1. Supervised direct patient care experience which allows the resident to:
  - a. Master ophthalmologic examinations skills
  - b. Formulate and work-up differential diagnoses
  - c. Manage medical ophthalmology problems of increasing complexity
  - d. Develop and exercise clinical and ethical decision-making abilities
  - e. Develop patient communication techniques, including communication to communities and populations as well as individual patients and families
  - f. Work effectively as a member of the medical care team
2. Supervised procedural and surgical experience should include:
  - a. Modern cataract and anterior segment surgical techniques including strabismus, glaucoma, cornea, ocular trauma, and ocular-plastics techniques
  - b. Anterior and post-segment laser surgery
  - c. Exposure to all areas of subspecialty surgery
3. Development of a broad fund of basic science and clinical knowledge through lectures, reading and interactive conferences, and review sessions
4. Exposure and opportunities for research, to teach residents to knowledgeably research results and to motivate residents to pursue projects
5. Development of teaching skills related not only to teaching of fellow ophthalmologists and residents, but also designed to address the education of other physicians, and medical students
6. Preparation for examinations which assess ophthalmic knowledge and competence

## PREREQUISITES FOR OPHTHALMOLOGY SPECIALTY EDUCATION

In most countries surveyed, there were mandatory requirements for entry into ophthalmology training. While variable, these in general included the equivalent of:

### 1. **Medical School**

Successful completion of a formal medical school or medical education program as defined or prescribed in the region or country; the applicant for ophthalmology residency training must have successfully completed a basic medical school education.

### 2. **General Medical Practice:**

In many countries, a year or more of general medical practice is required prior to entry into training for the specialty of ophthalmology. In some instances, this general medical practice or “internship” year is merged into the specialty training in ophthalmology.

### 3. **Licensure:**

Obtaining a license and/or certificate to practice medicine is a requirement for ophthalmologists-in-training either before or during the ophthalmology specialty training program. Some form of licensure is required to practice medicine in most areas of the world. Such licensure is in addition to, and distinct from, a certificate of residency training completion provided at the end of residency training program.

## OPHTHALMOLOGY CURRICULUM TOPICS

### 1. **Basic Sciences**

Most responding residency training programs from around the world included most of the following topics as part of the curriculum for residency education:

- Anatomy of the eye
- Neuro-anatomy related to the visual system
- Physiology of the eye
- Embryology of the eye
- Pharmacology related to general medicine and ophthalmology
- Pathology of the eye

- Microbiology and immunology of the eye
- Genetics of eye disease
- Molecular and cell biology related to the eye
- Statistics, biometry and ophthalmic epidemiology
- Basic principles of ophthalmic surgery.

## **2. Optics and Refraction**

All programs included education and training in assessment of the optical and refractive status of the eye and the importance of acquiring the necessary education skills to refract the eye and prescribe appropriate correction and also to understand the principles of fitting glasses and contact lenses:

- Physical and geometric optics
- Clinical optics
- Clinical refraction
- Instrumentation required for refraction
- Methods of clinical examination
- Instruction and use of fitting and management of contact lenses of all types

## **3. Clinical Training**

Clinical training is accomplished in various ways. Whether clinical training is initiated in the first year or in later years of the program, there was a broad consensus on the categories of eye disorders which should constitute ophthalmology specialty training:

- External eye diseases—infections, inflammations, neoplasia
- Intraocular inflammation and infection
- Glaucoma
- Lens and cataract
- Choroid and retina-vitreous disorders
- Diseases of the orbit, eyelids and lacrimal system
- Diseases of childhood, especially strabismus and genetic disorders
- Neuro-ophthalmology
- General medical conditions
- Ophthalmic-plastics and surgery
- Surgical retina, including lasers
- Ocular oncology
- Eye pathology

## DURATION OF OPHTHALMOLOGY SPECIALTY TRAINING

There is significant variation in the length of training for ophthalmologists, from a minimum of two years to a maximum of six years. In some instances, training also included the last stages of general medical education or the equivalent of an “internship.” The Task Force makes no specific recommendation concerning the duration of ophthalmology specialty training, but rather recommends that the duration be adequate to achieve the goals and principles of training as outlined in this report, at all times sensitive to the needs of the particular country or region. In general, specialty education should be no less than two years and probably three to five years in duration.

## PROCESS OF RESIDENT EDUCATION

The Task Force emphasizes that medical education, including specialty education for ophthalmologists, is a life-long commitment for all physicians in order to maintain competency in any specialty, including ophthalmology. Ophthalmology residency is part of this continuum of education from medical school (or its equivalent) to post-residency continuing medical education. This graduated process includes all aspects of resident education, whether in the basic sciences or clinical training, including graduated hands-on procedural and surgical experience. Residents should proceed through such a graduated training process according to their success in achieving curriculum goals and milestones over the training period.

## FACILITIES

### **A Culture of Learning and Teaching**

The Task Force suggests that the single most important characteristic of a successful resident education program is the development of a culture and tradition of learning and teaching which is not so much dependent on the nature of the physical facilities themselves but rather on the commitment of the faculty ophthalmologists responsible for the residency education program. The most modern facilities are no substitute for committed and dedicated educators.

That said, assuming that such a culture and tradition exist, most surveyed programs recognize the need for adequate facilities in order to achieve educational goals for specialist training. These include:

1. Up to date ophthalmic equipment and instruments
2. Examining rooms dedicated for ophthalmologist education
3. Access or association with a hospital in which there are 24-hour anesthesia, laboratory, radiology and other diagnostic services
4. Operating suites with equipment to assure modern surgical experience and training, including the use of operating microscope, microsurgical instruments, suture material, etc.
5. Suitable library facilities or the equivalent (internet access, etc.) which include access to ophthalmologic educational materials, journals, text, video tapes, etc.

#### **Facilities for Conferences and Lectures**

Almost all programs made arrangements for adequate facilities for lectures and conferences in order to accomplish educational goals. This included appropriate audio-visual equipment.

#### **Regular Audit and Assessment of Ophthalmologists-in-Training Progress**

Most programs referred to the importance of some form of periodic evaluation of the resident-in-training as he/she progressed through the curriculum. Examples included annual in-service examinations, the maintenance of a logbook or record of the resident's surgical and medical experience, and oral or written examinations developed by the faculty of the training program.

The Task Force recommends that some form of regular (annual) assessment be built into the curriculum. Documentation of adherence to established performance standards and milestones throughout the training program provides assurance that the resident is progressing through the training program in an appropriate manner. It also provides a measure of quality assurance for external agencies or organizations which may require such documentation.

**Assessment upon Completion of Residency**

Information about the assessment of ophthalmology residents after successful completion of the residency program was not available in many instances. Perhaps these data are more available from the International Council of Ophthalmology assessment for ophthalmologists coordinated by Professor Peter Watson. It is the opinion of the Task Force that a formal examination of graduating ophthalmologists, at some point within one to three years after completion of the residency training program, is a desirable and important goal.

The International Council of Ophthalmology has undertaken the development and conduct of International Assessment for Ophthalmologists. The Task Force supports the principle of requiring such an evaluation as part of the education and training for ophthalmology residents.

*July 29, 2000*

## INTERNATIONAL ASSESSMENTS FOR OPHTHALMOLOGISTS

Peter G. Watson, FRCS, FRCOphth

The International Council of Ophthalmology's Assessments for Ophthalmologists have been available for seven years. They are now beginning to have a major impact on the post-graduate education of those wishing to practice ophthalmology anywhere in the world. For the past five years, almost 1,000 people from 48 countries have taken the Basic Science Assessment. Those who have passed this Assessment or its equivalent are able to take the Clinical Sciences Assessment which has now been fully established.

### *What is the International Council of Ophthalmology?*

The International Council of Ophthalmology is the executive body of the International Federation of Ophthalmic Societies. Part of the work of the Council is to enable countries to work towards an internationally accepted standard of education of all ophthalmologists both during and after their training. The Basic Science and Clinical Sciences Assessments are part of this process.

### *What are the topics covered in the Assessments?*

#### BASIC SCIENCE

1. Anatomy of the eye and the orbit
2. Neuro-anatomy related to ophthalmology
3. General principles of physiology related to the practice of ophthalmology including embryology
4. Ocular physiology
5. Pharmacology and pathology including the microbiology related to ophthalmology
6. Optics and refraction

CLINICAL SCIENCES

1. General medicine related to ophthalmology
2. Ophthalmic pathology and intraocular tumours
3. Neuro-ophthalmology
4. Paediatric ophthalmology
5. Orbit, eyelids and lacrimal disease
6. External disease and cornea
7. Intraocular inflammation and uveitis
8. Glaucoma
9. Lens and cataract
10. Retina and vitreous

*How are these Assessments conducted?*

The International Council of Ophthalmology's Assessments consist of multiple-choice question papers in Basic Science as related to Ophthalmology, Refraction and Optics and in the Clinical Sciences related to Ophthalmology. The questions are set by an international panel of experts on the topics to be assessed. The questions also reflect the international nature of ophthalmology and contain questions of importance to those working in tropical countries and areas of poverty. The Assessments are taken at a designated centre in the candidate's own country on the same day throughout the world. The papers are marked by computer and the results are scrutinised by the examiners. The pass mark is generated statistically. This can be done reliably because of the large number of candidates taking the test. Furthermore, the response to each question by all the candidates examined is analysed statistically. In this way, the validity of the questions can be confirmed and the scoring adjusted accordingly. In addition, the answers to some of the questions are compared with the results achieved in other examinations.

*How soon are the results received by the candidates?*

The papers are returned to the U.K. by courier. As many centres are in remote parts of this world, this takes many days. Once the papers have been collected, they are marked by computer. When this has been completed, the results are confirmed by an examination committee.

Certificates are then issued to those who have passed, passed Part I, passed with distinction, and/or passed with credit. A full analysis of the results of each section is dispatched to the candidate. This entire process takes 6–8 weeks.

*How confidential are the results?*

Each candidate is informed as to how he/she has performed in each section of the test. The coordinator is informed about who in his/her group has passed or failed, but not of each individual's subsection score. Only the Chairman of the Examination Committee knows the full results. This process ensures that individual and perhaps unjustified comparisons are not made between countries, departments or individuals.

*What is the value of these Assessments to the candidates?*

These Assessments are deliberately of a very high standard so that anyone who has passed is known by everyone to have a very high standard of theoretical knowledge in the sciences related to ophthalmology. This is now recognised to be the case internationally, so it is extremely helpful for those wishing to observe or continue training in countries or institutions other than those in which they were originally trained.

The Assessments give exemption from parts of certain examinations in other countries, e.g., Part A of the fellowship of the Royal College of Physicians and Surgeons of Glasgow.

*Advantages to Countries and Institutions*

These Assessments are of a high standard, internationally set, marked and monitored. The examination is secure and can therefore be used (and is being used) to ensure a high standard of knowledge of those entering a residency programme in ophthalmology. It can also be used 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. These tests do not in any way test competence or technical ability in the practical aspects of ophthalmology or ophthalmic surgery.

*Is a diploma granted?*

A *certificate* is given to those who pass, but the Assessments are not intended as accrediting examinations. Although the Assessments can be used as part of an examination, it is the responsibility of each country, university or institution to decide how they are used and how much weight to give to the acquisition of theoretical knowledge. It is expected that the institution will carry out face to face examinations and other forms of testing before accreditation. The requirements of accrediting bodies vary considerably from place to place so no universally applicable diploma can be awarded.

FEES

The fees are kept to an absolute minimum in order to enable those who have poor salaries to take part in the Assessments. If an individual cannot afford the fee, then a coordinator can apply for a bursary from the small amount of funds set aside for this purpose.

APPLICATIONS

Application forms and further details are available from:

THE EXAMINATION OFFICE  
2 Wort's Causeway  
Cambridge CB1 8RN  
United Kingdom

PHN 44 1223 244101

FAX 44 2113 244079

E-MAIL [ico.exam@btinternet.com](mailto:ico.exam@btinternet.com)

*October 21, 2000*

## TASK FORCE ON ALLIED OPHTHALMIC PERSONNEL TRAINING

Rubens Belfort, Jr., M.D., Ph.D.

Koji Konyama, M.D.

The Task Force on Allied Ophthalmic Personnel Training realizes the great need for and service of allied ophthalmic personnel to increase the productivity of the ophthalmic specialists. Since the training of ophthalmic specialists requires many years, allied ophthalmic personnel may be trained more expeditiously in order to meet the eye care needs of the 45 million blind people and 135 million visually handicapped in the world.

The task force proposes that all allied ophthalmic personnel—including optometrists, ophthalmic technologists, orthoptists, ophthalmic assistants—and ophthalmologists be organized and trained under one system so that there may be a unified effort for delivery of improved eye care service. By a unified training system, the provision of different levels of eye care service, the number of service personnel and the quality of service may be achieved effectively and efficiently. The task force urges that all ophthalmic communities consider a unified educational system for eye care personnel.

*July 7, 2000*

## ALLIED OPHTHALMIC PERSONNEL TRAINING

Mr. R. D. Thulasiraj, Executive Director  
Lions Aravind Institute of Community Ophthalmology

### COMMUNITY-BASED EYE HEALTH WORKERS

These workers play a very crucial role as a link between the community and institutions providing eye care services. They can play a very crucial role in increasing the awareness, providing first line of treatment, counseling, motivating and providing follow-up services. They can also be trained to provide refraction services. India has about 6,000 Para Medical Ophthalmic Assistants (that is what they are called —PMOAs) with such training, working in the community. Nepal is also a good example of a country using such people.

- s Specify the job responsibilities in the areas of health education, treatment and referral. Also define the population base.
- s Based on the above, develop a detailed training curriculum. The curriculum, in addition to training in the clinical aspects, should also train the workers in other areas like record keeping, monitoring, planning their work, etc.
- s The training must also include how to interact with other related agencies like the primary health care system and the secondary/tertiary eye care systems.

It is obvious that the work definition, need for such personnel and the training programme will depend on the eye care priorities and the existing infrastructure in the country. So while there can be a generic framework for defining the job and the curriculum, in effect each country must be encouraged to come up with its own training programme.

## HOSPITAL-BASED MID-LEVEL EYE CARE PERSONNEL

These personnel are essential to enhance the efficiency of an ophthalmologist and contribute both to the quantity and quality of eye care services provided. In several countries (e.g., in Bangladesh and India) and in many settings, the ophthalmologist does all the clinical investigation and a lot of the preparatory work, most of which can be very safely delegated to well-trained ophthalmic paramedics. With good training they can do all the measurements, be it the visual acuity, fields, tonometry or ultrasonography. In surgery, they can do a lot of the preparatory work including administering local anesthesia, being the first assistant in surgery and being able to help in the postoperative period. They can also do counseling for the patients and clarifying doubts relating to their eye condition and treatment. Here again, in order to proceed, the training programme requires similar steps:

- s Define the role and activities of the hospital based ophthalmic paramedic.
- s Based on the above, develop a detailed curriculum which would impart necessary knowledge and the practical skills to carry out the activities with complete understanding of the desired standards.

Since there are varying levels of sophistication in the delivery of eye care services, the training can be offered in two or more modules starting with the basic ophthalmic techniques and progressing to the more advanced techniques like imaging, photography, etc. This training is more amenable to a generic model since the work is within a hospital setting, which would be quite comparable across countries. However, some adaptation and moderation will need to be done based on the local laws and practice of ophthalmology.

*September 20, 2000*

# TRAINING CURRICULUM FOR COMMUNITY-BASED EYE CARE WORKERS

**Ministry of Health  
Government of India**

*Excerpted from the Detailed Training Curriculum and Procedures for Evaluation of Training, Knowledge and Skill.*

The Programme envisages creation of a category of para-medical personnel known as Ophthalmic Assistants to assist Primary Health Centre (PHC) Medical Office of Ophthalmic Surgeon in early detection of visual impairment and in other activities concerning the National Programme for the Control of Blindness. A two-year training programme for this purpose has been introduced. By the end of VIth Plan, 37 Training Schools, most of them in Medical Colleges and Regional Institutes, have been established. The programme of training includes six months institutional training followed by field practice for six months each at District Hospital, Primary Health Centre and Mobile Unit.

At the end of the training, the trainee is expected to be able to render the following services:

- s Carry out eye health education activities;
- s Assistant Medical Officer PHC/Ophthalmic Surgeon in estimation of refractive errors and treatment of common disorders of ocular motility;
- s Carry out common ophthalmic diagnostic procedures.

## CRITERIA FOR SELECTION

The minimum qualification for selection of the candidates for the training is Higher Secondary (10+2) with minimum of 40% marks. The candidates selected for the training get a stipend of Rs. 150 p.m. They have to execute a bond to serve the government for a period of five years. The qualifications are relaxable in case of candidates from the Andaman & Nicobar Islands and from the North Eastern Region.

### **Intake of Trainees**

The annual intake of trainees in each school is 30 in two batches of 15 students each after every six months. About 1,000 Ophthalmic Assistants are expected to be trained every year.

### **Duties of Ophthalmic Assistants**

1. Test vision and prescribe glasses.
2. Assist Medical Officer PHC in providing primary eye care including treatment for trachoma, conjunctivitis and associated infections.
3. Assist Mobile Unit in conducting eye care camps.
4. Survey the community for early detection of eye defects.
5. Organise community eye care education activities.
6. Train staff at peripheral level.

### **Two-Year Training Course Curriculum For Ophthalmic Assistants**

The training course is to be undertaken in identified medical colleges, eye hospitals and institutions.

The field training is to be imparted in the Mobile Ophthalmic Unit, identified District Hospitals and identified PHCs.

The broad objectives, institutional objectives, admission rules of the course were discussed and recommended as follows:

#### **OBJECTIVES**

To produce ophthalmic assistants (para-medical technician worker) who should be able to assist in the early detection of visual impairment and control of blindness as a part of health manpower development under the National Programme for Control of Blindness.

INSTITUTIONAL OBJECTIVES

*The students at the end of the training shall be able to:*

1. Impart health education regarding ophthalmic disorders.
2. Render assistance to ophthalmologists/doctors at eye institutions, District Hospitals.
3. Assist in the estimation and treatment of errors of refraction and common disorders of ocular mortality.
4. Be able to perform common ophthalmic diagnostic procedures.

TRAINING COURSE

It shall comprise of two-year training conducted by the Medical College as under:

*Phase I:* Six-month training in Medical Colleges/Institutes

*Phase II:* One and one-half year training in the field practice area (Mobile Ophthalmic Unit, District Hospital and PHCs)

After the completion of Phase I, Ophthalmic Assistants shall be posted in the Mobile Ophthalmic Unit for six months, then posted for six months in District Hospitals and finally posted for six months in PHCs.

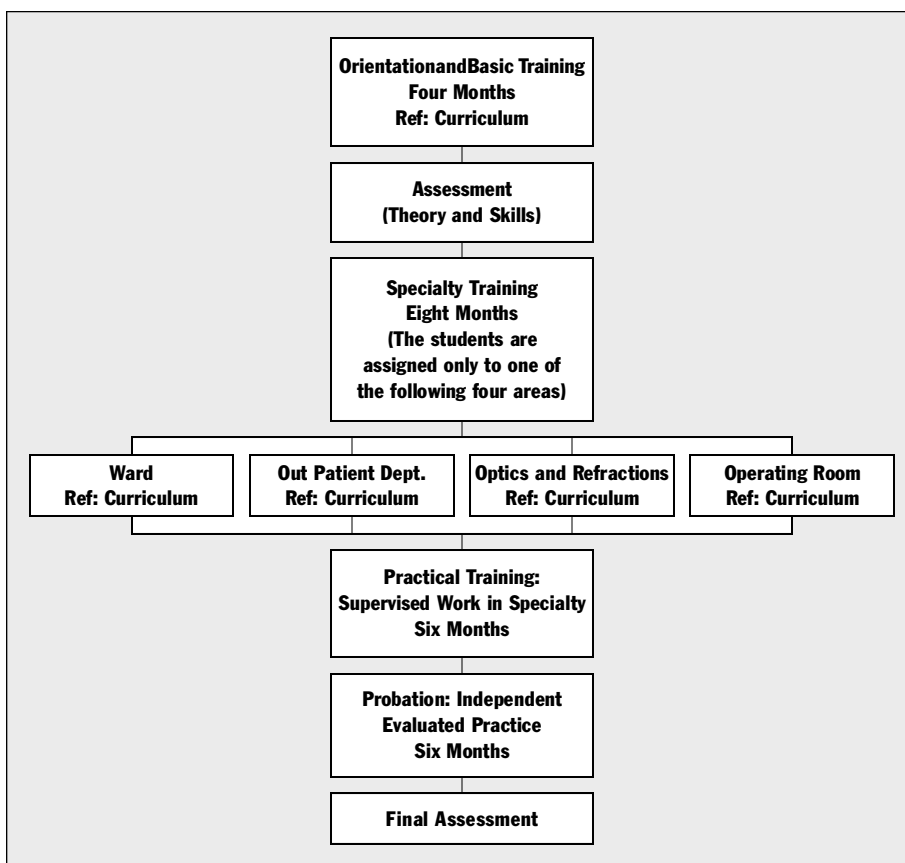
*September 20, 2000*

# TRAINING CURRICULUM FOR HOSPITAL-BASED OPHTHALMIC ASSISTANTS

Aravind Eye Hospital  
Madurai, India

*Excerpted from the Detailed Training Curriculum and Procedures for Evaluation of Training, Knowledge and Skill.*

STRUCTURE OF THE TRAINING PROGRAMME  
TOTAL DURATION: TWO YEARS



**Course of Study, Evaluated Knowledge, Attitudes and Skills for Aravind's Ophthalmic Assistants In Basic Training**

OBJECTIVES:

The objectives of this course are to

1. Develop familiarity with basic human anatomy and physiology
2. Understand the anatomy and functions of the eye in detail
3. Record clinical data for interpretation by the ophthalmologist
4. Describe common diseases of each structure of the eye
5. Develop basic skills in caring for patients and their environment
6. Understand the role and responsibilities of the ophthalmic clinical assistants as team members in patient care
7. Develop communications skills for effective human relations
8. Demonstrate professional demeanor in dealing with patients, doctors and colleagues
9. Recognize and define compassion, and demonstrate compassionate treatment of patients and staff
10. Demonstrate effective work habits and initiative
11. Provide appropriate patient instruction and education
12. Develop theoretical and practical knowledge as a foundation for specialty training
13. Understand basic public health concepts
14. Update the nurses with modern techniques

**KNOWLEDGE**

- s **Medical Law, Medical Ethics, and Professional Behavior**
- s **Medical Terminology**
- s **Human Anatomy and Physiology**
  - Digestive System
  - Excretory System
  - Respiratory System
  - Cardiovascular System
  - Musculo-Skeletal System
  - Sensory System
  - Endocrine System
  - Reproductive System
  - Nervous System
- s **Ocular Anatomy and Physiology**
- s **Ophthalmic Terminology**
  - Gross Anatomy of the Eye
  - Detailed Functions
  - Ophthalmic Disorders and Diseases
  - Management of Ophthalmic Disorders and Diseases
- s **Pharmacology**
- s **Microbiology**
- s **Biochemistry**
- s **Medical and Ophthalmic Emergencies**
- s **Use and Care of Ophthalmic Instruments and Equipment**
- s **Theory/Principles of**
  - Ward
  - Out Patient
  - Operation Theatre
  - General Anesthesia
  - Human Relations Theory
  - Outreach and Public Health

## **ATTITUDES**

- s Adoption of Organizational Values, Culture, Rules and Expectations
- s Demonstration of Compassion in Patient Care
- s Demonstration of Respect in Dealing with Doctors and Colleagues
- s Demonstration of Working Habits, Initiative

## **SKILLS**

- s Patient Care
- s Assisting Doctors
- s Effective Human Relation Skills
- s Demonstrating Aravind Values and Culture
- s Managing Medical and Ophthalmic Emergencies
- s Use and Care of Ophthalmic Instruments
- s Lab Skills

## **PRACTICE**

- s Ward Skills
- s Out Patient
- s Refraction Skills
- s Operation Theatre Skills

*September 20, 2000*

# PROPOSED CURRICULUM ON TRAINING OF MID-LEVEL EYE CARE PERSONNEL

## World Health Organization Southeast and Western Pacific Regions

*Excerpted from the Detailed Training Curriculum and Procedures for Evaluation of Training, Knowledge and Skill.*

Most Member States in the WHO Regions of the Southeast and the Western Pacific have been expecting a new category of eye care personnel for many reasons, especially related to the developing and strengthening of blindness prevention. A new category implies developing a new professional providing eye care services, whose role is called ophthalmologist assistant or substitute. The former category may be working in the tertiary and secondary facilities, while the latter at the primary level, where an ophthalmologist is absent. **This is a concept of Mid-level Eye Care Personnel (MLEP) for blindness prevention and eye care services.** Their activities might help to increase coverage of care at every level of eye care services while quality could be sustained at the desirable level. Thus, the issue is repeatedly brought to the meetings of blindness prevention for its early implementation.

The WHO Workshop on Evaluation of Prevention of Blindness programs held in Sydney (1992) concluded that the issue is a regional priority. The next WHO joint inter-country workshop in Utsunomiya, Japan (1993) and two task forces meetings of the Member States in Manila (1995) and Kuala Lumpur (1996) succeeded in producing the regional model of standard curriculum.

In pursuance of the recommendations of the above mentioned workshops and meetings, the present working group had as its prime objective the development and completion of the structure and content for the training core curriculum for MLEP that will be applied in the countries in the region.

THE OBJECTIVES OF THIS WORKING GROUP ARE:

1. To review the strategies and current situation in the training of the MLEP, which will ensure effective delivery of eye care especially in developing countries.
2. To develop the core curriculum for training of MLEP in order to carry out the implementation of the regional and national program on prevention blindness.

The objective of the training course for MLEP is to give the trainees task-oriented, multidisciplinary and community-oriented training which will provide them with appropriate knowledge, attitudes and skills to work effectively as an eye care team member at every level of the eye care delivery system. The curriculum is very useful and significant for human resource development in order to strengthen blindness prevention programs in each country in the region.

USE OF THE MODULES

The guidelines for this core curriculum consist of five modules covering all necessary basic functions expected of mid-level eye care workers. The guidelines set out the learning objectives of each module, and the subtopics related to each objective. The group felt that the contents in relation to each would be generally country specific and need to be developed at the national level, as appropriate.

The recognition and adaptation of these modules for MLEP training should be officially distributed nationwide. The introduction of these modules to the national trainers should be implemented as early as possible for them to train other MLEP in each country of the region.

**Module 1: Overview on Blindness**

GENERAL GOALS

Students should understand:

- a. Blindness and visual impairment with its implications.
- b. Structure of the National Program for Prevention of Blindness (PBL) based on primary health centre (PHC) strategies.

- c. The concept of avoidable and unavoidable blindness.
- d. Necessary actions for blindness elimination and control (PEC, PHC, PBL approaches).

### **Module II: Basic Clinical Functions**

#### GENERAL GOALS

Students should gain the knowledge, attitude and skills in the various roles of providing and assisting in eye care in different settings.

### **Module III: Basic Eye Health Management Functions**

#### GENERAL GOALS

Students should be able to acquire the knowledge and skills of the epidemiological approaches and their application to assist prevention of blindness program manager.

### **Module IV: Basic Training Function**

#### GENERAL GOALS

At the end of module, the students should be able to:

- a. Assist the ophthalmologist in primary eye care training at second and first level of referral and first level of contact.
- b. Teach primary eye care in the community.

### **Module V: Basic Technical Functions**

#### GENERAL GOALS

The students should be able to develop the KSA in:

- a. The proper use of selected equipment in eye care provision.
- b. The care and maintenance of minor optical equipments and ophthalmic instruments.
- c. Aseptic techniques.

*June 30, 2000*

## OPHTHALMOLOGY CONTINUING EDUCATION

**H. Dunbar Hoskins, M.D., Goal Chairman**  
**Mr. David Green, Goal Co-Chairman**

### TASK FORCE ON OPHTHALMOLOGY CONTINUING EDUCATION

**H. Dunbar Hoskins, M.D.**

Ophthalmology continuing education extends throughout the career of an ophthalmologist. Education encompasses the development and dissemination of educational materials and programs 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.

The principal results that can be obtained by the task force are:

1. Encourage career-long continuing education by all ophthalmologists, particularly in the areas of personal professional practice.
2. Identify high-quality continuing education materials and programs for use by ophthalmologists worldwide.
3. Stimulate ophthalmologists to evaluate professional knowledge and skills by periodic objective knowledge assessment procedures and outcome assessment programs.
4. Promote innovative programs of knowledge enrichment by special fellowships and twinning partnerships.

*May 20, 2000*

## NEXT STEPS FOR THE TASK FORCE ON OPHTHALMOLOGY CONTINUING EDUCATION

H. Dunbar Hoskins, M.D.

I. GATHER INFORMATION (JANUARY–AUGUST, 2001)

**A. Conduct an initial survey of all national ophthalmological societies to ascertain:**

1. Whether or not the society provides, organizes or sponsors continuing medical education activities or materials.
2. Whether or not the nation has a system of providing credit for continuing education participants and/or accrediting continuing medical education (CME) providers.
3. Whether or not the society currently has a website.
4. The language(s) of instruction for continuing medical education in the country.
5. Any specific continuing education needs the society has identified that it would like the International Council of Ophthalmology (ICO) to consider.

**B. Develop a second survey to those national societies that are involved in continuing medical education to:**

1. Request the society to send any documentation they produce or use to organize general topics, skills, or competencies required or suggested for ophthalmologists in practice.
2. Obtain a listing and description of materials they develop, sponsor, distribute or utilize for the continuing medical education of ophthalmologists, including any self assessment programs.

II. COORDINATE INFORMATION RECEIVED WITH THE  
OPHTHALMIC EDUCATION AND TRAINING GOAL  
COMMITTEE TO AVOID DUPLICATION.

(August–October, 2001)

A. International Ophthalmology

Specific attention should be given to the new Section on International Ophthalmology in the Ophthalmology Basic and Clinical Science Course of the American Academy of Ophthalmology. The new section emphasizes the important role of ophthalmologists in decreasing vision loss and blindness worldwide.

III. ORGANIZE THE INFORMATION COLLECTED INTO A DATA-  
BASE FOR ICO FUTURE PLANNING AND DISSEMINATION.

(January–April, 2002)

IV. FROM THE DATABASE IDENTIFY SPECIFIC PROJECTS,  
PRIORITIZE, AND ESTABLISH ESTIMATED COSTS.

(April 2002 ICO meeting agenda item)

*September 7, 2000*

INTERNATIONAL FEDERATION OF  
OPHTHALMOLOGICAL SOCIETIES/  
INTERNATIONAL COUNCIL OF  
OPHTHALMOLOGY INTERNATIONAL  
FELLOWSHIP

Balder R. P. Gloor, M.D.

Gullapalli N. Rao, M.D.

Ronald E. Smith, M.D.

Mark O. M. Tso, M.D.

REGULATIONS OF THE FELLOWSHIP

Balder R. P. Gloor, M.D.

**1. Name**

Fellowship of the International Federation of Ophthalmological Societies (IFOS) and its executive body, the International Council of Ophthalmology (ICO) *Abbreviation: The IFOS/ICO—International Fellowship*

**2. Aim**

The IFOS/ICO fellowship has been established to support promising young ophthalmologists in an essential phase of their curriculum, to improve their practical skills and broaden their views in ophthalmology. The fellows will be expected to bring the acquired knowledge and skills to their own country to take part in the fight to prevent avoidable blindness. By awarding young ophthalmologists this fellowship, IFOS/ICO will establish a definitive contribution to the Vision 2020 project, will prevent avoidable blindness, will contribute substantially to *Vision for the Future* and will enhance the collaboration between different institutions dealing with eye care.

**2. Duration**

3 months (as a rule)

### **3. Type of Fellowships**

The fellowship may be in comprehensive ophthalmology or in areas of subspecialties such as:

- Pediatric Ophthalmology
- Cornea and External Disease
- Glaucoma
- Medical and/or Surgical Retina
- Cataract Surgery
- Ophthalmic Oncology
- Uveitis
- Neuro-ophthalmology and Strabismus
- Other Subspecialties

### **4. Qualification of Applicants**

Candidates (a) must have completed three years of residency training in ophthalmology; (b) should preferably be in or aspiring to a teaching position; (c) should preferably be below 40 years of age; and (d) must demonstrate the candidate's commitment and the commitment of the institution to which the candidate will return that he/she will continue in this institution for at least two years subsequent to completion of the fellowship.

### **5. Remuneration, travel expenses and insurance**

- a. A stipend which is consistent with the living expenses in the country of training. The stipend will be sufficient and cover the expenses of a single person in student-style living.
- b. Travel expenses: inexpensive economy flight round trip ticket.
- c. Organization of health, accident and liability insurance has to be provided by the home country or preferably by the host institution.
- d. The applicant should submit a budget with the application.

### **6. Reporting**

The applicant and the teaching institution are required to submit a report concerning the strengths, weaknesses and accomplishments of the fellowship at the end of the fellowship. The ICO should be kept informed of the activities of the applicant upon return to his/her home institution at least on an annual basis for two years.

## **7. Selection**

- a. COMMITTEE: A committee appointed by the ICO will make the selection.
- b. CRITERIA:
  1. Candidate's qualifications
  2. Need of the host institution/country
  3. Geographic representation

## **8. Announcement**

Announcement of the fellowship should be through the IFOS/ICO, International Agency for the Prevention of Blindness and supranational and national ophthalmological societies.

## **9. Training Centres**

The ICO will develop a directory of training centers willing to accept IFOS/ICO fellows. Applicants, through their departments, may seek training centers agreeable to take them for training. The training centers must be willing to make extra efforts to assure that the IFOS/ICO fellows achieve the targets set. Personal contact between the host and home institution is required. The help of institutions experienced in eye care in underprivileged countries may be arranged by the IFOS/ICO.

## **10. Timetable**

The selection should be completed at least 6 months before the commencement of the fellowship.

## **11. How to Proceed**

The person to be contacted by the applicant is the treasurer of the IFOS/ICO. At present this is:

BALDER R. P. GLOOR, M.D.

Hinterbergstrasse 91

CH 8091 Zurich

Switzerland

PHN 41 01 362 14 10

FAX 41 01 362 14 24

E-MAIL [bgloor@access.unizh.ch](mailto:bgloor@access.unizh.ch)

**Instructions for applicants for the IFOS/ICO International Fellowship:**

The person to be contacted by the applicant is the treasurer of the IFOS/ICO. The first step is to ask for the directory of training centers. The directory will be sent to the applicant together with instructions on how to proceed.

The applicant should contact training centers of his/her choice and make sure that he/she would be accepted as an IFOS/ICO fellow. The applicant has to specify clearly to the future host what he/she would like to learn. It is recommended that the applicant adds to his/her letter of application a recommendation of his/her present chief or supervisor who would be required to be in contact with the potential host.

The applicant then submits three copies of a formal application:

1. Letter of application, stating present phase of training and position, plans for the future, specifying the aims of the fellowship, plans after return into their home country
2. Exact information in which language he/she can communicate: native language; other languages written and/or oral (excellent, good, fair, poor)
3. Curriculum vitae
4. List of publications and teaching activities
5. Two letters of recommendation, one from the present head of department, another from a previous chief, supervisor, employer, teacher, etc.
6. Affirmation of head of department of the present institution that the individual will be able to resume work at the institution after the fellowship and that the facilities will be available for the fellow to implement what has been learned
7. Copy of the letter of acceptance of the fellowship host stating that the objectives of the candidate and of the IFOS/ICO will be met within the time of the fellowship

As soon the fellowship is awarded, the applicant will be informed and will receive a form to be completed to specify the financial matters.

*January 10, 2001*

# TWINNING OF NATIONAL OPHTHALMOLOGY SOCIETIES

Pran N. Nagpal, M.D.

## BACKGROUND

1. Most of the ophthalmology national societies have the non-political aim of creating a platform for propagation of knowledge around ophthalmology and ultimately improving and modernising the eye care to the community.
2. They all have annual meetings and create other educational materials and programs of different sorts. Probably amongst the developed nations, the American Academy of Ophthalmology is the best national society to have achieved this aim. Developing countries in the Third World are generally at a very low level.
3. Most of the new developments in ophthalmology are taking place in the developed world. There is a great desire on the part of ophthalmologists of the developing world to look to developed countries for knowledge and also the methodologies for transmission of knowledge to their colleagues.

## PURPOSE OF TWINNING

1. To achieve transfer of knowledge from developed countries to ophthalmologists of developing countries.
2. To make available the know-how of different methods to transmit this knowledge.

*Twinning of a developed nation's ophthalmological society with that of a developing national society could help this cause.*

*How do we achieve it?*

1. Some designated and desirous ophthalmologists of a developed nation's society should regularly attend the annual meetings of the developing nation's society and not only bring knowledge, but also help the developing nation's society to frame a locally useful program for annual meetings and for other educational materials.
2. Allow a few designated and desirous ophthalmologists of developing nation's society to attend annual meetings of developed nation's society. This exposure will help the developing nation's society to develop programs for its meetings.

As an incentive to this exchange, both societies should provide some kind of facilitation to the attending members of the other society.

The American Academy of Ophthalmology is trying to facilitate international exchange (for example, by providing free registration and "Host an ophthalmologist" programs), but this could be done by many other societies.

There may be a time limit of such twinning and a change over to new combinations.

At the same time, a developing nation's society can be twinned with a more developed one on one hand and twinned with a less developed nation's society on the other hand. Language considerations will have to be given special attention while twinning national societies.

*October 21, 2000*

# EYE CARE GUIDELINES AND RECOMMENDATIONS

**Gabriel J. Coscas, M.D., Goal Chairman**

**Peter G. Watson, FRCS, FRCOphth, Goal Co-Chairman**

## TASK FORCE ON EYE CARE GUIDELINES AND RECOMMENDATIONS

**Gabriel J. Coscas, M.D.**

**Peter G. Watson, FRCS, FRCOphth**

Eye care guidelines and recommendations were identified as extremely important by the Task Force and affirmed by the International Ophthalmology Strategic Planning Group during the meeting in Jerusalem, Israel, on May 20, 2000. Topics identified for guidelines and quality of care recommendations to aid ophthalmologists in many countries are stated hereafter.

1. Cataract Surgery
2. Diabetic Retinopathy
3. Glaucoma Diagnostics
4. Glaucoma Surgery
5. Comprehensive Eye Examinations
6. Corneal Transplantation
7. Eye Banking
8. Trachoma
9. Strabismus
10. Evaluation of Children's Eyes
11. Pediatric Eye Surgery
12. Retinopathy of Prematurity
13. Corneal Infections
14. Postoperative Endophthalmitis

*May 20, 2000*

# **PREFERRED PRACTICE PATTERNS™: AMERICAN ACADEMY OF OPHTHALMOLOGY**

**Bruce E. Spivey, M.D.**

The American Academy of Ophthalmology has developed precise and detailed Preferred Practice Patterns™ relevant to major categories of eye disease and surgery.

Copies of representative Preferred Practice Patterns™ have been distributed by the American Academy of Ophthalmology to Gabriel J. Coscas, M.D., and Peter G. Watson, FRCS, FRCOphth, co-chairs of Eye Care Guidelines and Recommendations, as well as a group of Consultants particularly knowledgeable and experienced in the delivery of quality eye care in diverse geographic regions and population groups in the world.

Among the Consultants invited to consider these guidelines are:

Richard L. Abbott, M.D.

Vasavada Adbay, M.D.

Hannah B. Faal, M.D.

Albrecht Henning, M.D.

Rabiul Hussain, M.D.

Gullapalli N. Rao, M.D.

Hugh R. Taylor, M.D.

Ravi Thomas, M.D.

The American Academy of Ophthalmology has provided Preferred Practice Patterns™ for the following subjects:

Age-Related Macular Degeneration

Amblyopia

Bacterial Keratitis

Blepharitis

Cataract in the Adult Eye

Comprehensive Adult Eye Evaluation

Conjunctivitis

Corneal Opacification  
Diabetic Retinopathy  
Dry Eye Syndrome  
Esotropia  
Management of Posterior Vitreous Detachment,  
Retinal Breaks, and Lattice Degeneration  
Pediatric Eye Evaluations  
Primary Angle-Closure Glaucoma  
Primary Open-Angle Glaucoma  
Primary Open-Angle Glaucoma Suspect  
Refractive Errors  
Rehabilitation: The Management of Adult Patients  
with Low Vision

*September 11, 2000*

**MANAGEMENT FOR OPHTHALMIC DISEASE  
IN THE ABORIGINAL AND TORRES STRAIT  
ISLANDER COMMUNITIES: EYE CARE  
GUIDELINES OF THE ROYAL AUSTRALIAN  
COLLEGE OF OPHTHALMOLOGISTS**

**Hugh R. Taylor, M.D.**

Guidelines for management of major categories of ophthalmic disease in the Aboriginal and Torres Strait Islander Communities have been developed by the Royal Australian College of Ophthalmologists. Guidelines relate to:

- s Management of cataract and intraocular lens surgery
- s Diabetic retinopathy
- s Trachoma

These materials, which are presented in the following sections, are under consideration by Gabriel J. Coscas, M.D., and Peter G. Watson, FRCS, FRCOphth, co-chairs of Eye Care Guidelines and Recommendations, as well as a group of Consultants particularly knowledgeable and experienced in the delivery of quality eye care in diverse geographic regions and population groups in the world.

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Gullapalli N. Rao, M.D.

Hannah B. Faal, M.D.

Hugh R. Taylor, M.D.

Albrecht Henning, M.D.

Ravi Thomas, M.D.

*September 4, 2000*

# **Clinical Practice Guidelines for Specialists in the Eye Health of Indigenous Australians**

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*Royal Australian College of Ophthalmologists,  
Commonwealth of Australia*

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DRAFT: February 7, 2001

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## *Introduction*

These guidelines have been produced under the auspices of the National Aboriginal and Torres Strait Islander Eye Health Program. They were developed by the Centre for Eye Research Australia, in collaboration with the Indigenous Sub-committee of the Royal Australian College of Ophthalmologists and a specialist reference group established to provide expert clinical and cultural input.

The guidelines are based on a review of existing literature and practice relating to three conditions particularly affecting the eye health of Aboriginal and Torres Strait Islander people: diabetic retinopathy, cataract and trachoma. They provide information about treating and managing these conditions in rural and remote communities and offer clinical and contextual advice about ‘best practice’ in eye health.

Although primarily for use by ophthalmologists, the guidelines are suitable for all professionals working in eye health in primary health care settings; this includes Aboriginal and Torres Strait Islander health workers, optometrists, orthoptists and allied health professionals.

### THE NATIONAL ABORIGINAL AND TORRES STRAIT ISLANDER EYE HEALTH PROGRAM

The National Aboriginal and Torres Strait Islander Eye Health Program is funded by the Commonwealth Department of Health and Aged Care through the Office for Aboriginal and Torres Strait Islander Health (OATSIH). The purpose of the Program is to improve Indigenous Australians’ eye health by facilitating access to eye health services in rural and remote communities.

The Eye Health Program reflects the broader OATSIH approach of seeking to improve comprehensive primary health care services for Aboriginal and Torres Strait Islander people—within their communities. Fundamental to this approach is the principle of working in partnership with interested parties and building on the broad network of community-based Aboriginal and Torres Strait Islander health services. In this way, primary health care efforts include a number of initiatives designed to facilitate access to eye health services in rural and remote communities.

## THE REVIEW OF ABORIGINAL AND TORRES STRAIT ISLANDER EYE HEALTH

The National Aboriginal and Torres Strait Islander Eye Health Program was initiated in 1998–99 in response to recommendations arising from a review commissioned by the Commonwealth Minister for Health and Family Services, the Hon. Dr. Michael Wooldridge, MP. The report of the review, *Eye Health in Aboriginal and Torres Strait Islander Communities—or the Eye Health Report*—highlighted the dearth of quality eye health services in rural and remote Indigenous communities and made a number of recommendations directed at comprehensive service delivery in these areas. Among the recommendations was that a regional model of eye health service delivery and coordination be introduced. This model incorporates a number of important elements, including locating eye health coordinators and ophthalmic equipment within defined regional service areas as resources available to Indigenous Australians living in each service area.

The Eye Health Program has been endorsed through the Aboriginal and Torres Strait Islander Health Framework Agreements in each State and Territory. These Agreements were established in 1996 to improve health outcomes for Aboriginal and Torres Strait Islander people by taking action such as ensuring full and formal Aboriginal and Torres Strait Islander participation in policy and decision making and improving access to both mainstream health services and those specifically for Indigenous Australians. The State and Territory affiliates of the National Aboriginal Community Controlled Health Organisation, the Aboriginal and Torres Strait Islander Commission, State and Territory governments and the Commonwealth Government are all signatories to the Agreements.

## DIABETIC RETINOPATHY, CATARACT AND TRACHOMA AMONG INDIGENOUS AUSTRALIANS

The burden of eye disease is disproportionately great among Aboriginal and Torres Strait Islander people compared with non-Indigenous Australians. The situation is exacerbated by a number of factors, among them geographical isolation, economic disadvantage, lack of transport and lack of access to health services, all of which limit the opportunities for prompt identification, management and treatment of eye health problems.

Diabetic retinopathy is the primary vision-threatening condition for Aboriginal and Torres Strait Islander people, who have higher prevalence rates for both diabetes and diabetic retinopathy than the general population. Compared with non-Indigenous Australians, Aboriginal and Torres Strait Islander people tend to develop diabetes at an earlier age and to be diagnosed with the condition at a later age; this dramatically increases their potential to develop severe diabetes-related complications such as retinopathy.

Cataract surgery is the main type of eye surgery Indigenous Australians need. But, compared with non-Indigenous Australians, the surgery is usually performed when the cataract is at a more advanced stage. Further, the clinical and surgical procedures used for screening and removal of cataracts vary considerably, leading to much variation in the quality of surgical outcomes for Aboriginal and Torres Strait Islander people.

Trachoma is completely absent in the non-Indigenous population but continues to exist at hyper-endemic levels—with a prevalence greater than 20 per cent—in some Aboriginal and Torres Strait Islander communities. Active (follicular or inflammatory) trachoma has been referred to as a ‘disease of the creche’, primarily because of its almost exclusive incidence in Indigenous children.

These three eye health problems—diabetic retinopathy, cataract and trachoma—represent a serious disadvantage to Indigenous Australians. The National Aboriginal and Torres Strait Islander Eye Health Program and, within it, these clinical practice guidelines seek to redress this disadvantage.

**Part 1**

**Diabetic Retinopathy**

## 1 INTRODUCTION

Diabetes is an important cause of morbidity among all Australians, but it also poses some problems that are specific to Aboriginal and Torres Strait Islander communities.

In 1997 the National Health and Medical Research Council (NHMRC) published clinical practice guidelines for the management of diabetic retinopathy. Part of that document contained information relevant to Indigenous communities. Using as references the NHMRC's work, other work published since 1997, and specific data on Indigenous Australians, the guidelines presented here describe the central elements of treating and managing diabetic retinopathy in Indigenous communities. The purpose is to encourage 'best practice' by providing information that is relevant to the health care professionals who work in these communities.

The guidelines are divided into two broad sections: Chapters 2 and 3 provide background and epidemiological information on diabetic retinopathy; Chapters 4 to 6 deal with detection and management of the condition.

## 2 BACKGROUND

### 2.1 Definitions

#### 2.1.1 DIABETES MELLITUS

Diabetes mellitus is a condition resulting from impairment of the body's ability to tolerate glucose. It is commonly classified into two types—insulin-dependent diabetes mellitus (IDDM, or type 1 diabetes); and non-insulin dependent diabetes mellitus (NIDDM, or type 2 diabetes). Because the distinction between IDDM and NIDDM is not always obvious, the National Health and Medical Research Council used the following definition:

Cases with diabetes onset prior to age 30 and treated with insulin (younger-onset) will be considered to have IDDM, while people with diabetes diagnosed from age 30 (older-onset), and treated with either diet alone, oral therapy or insulin, will be considered to have NIDDM.<sup>1</sup>

NIDDM is by far the most common form of diabetes found in Aboriginal and Torres Strait Islander people.<sup>2</sup>

Both types of diabetes can lead to diabetic retinopathy.

### 2.1.2 DIABETIC RETINOPATHY

The NHMRC defined diabetic retinopathy as the typical retinal microvascular lesions<sup>1</sup> that occur in nearly all people having diabetes over a long period.

Among the lesions that can occur are microaneurysms, haemorrhages, hard exudates, cotton-wool spots, intra-retinal microvascular abnormalities, venous beading, new vessels and fibrous tissue. None of these is specific to diabetes, but with diabetic retinopathy there is a characteristic pattern, symmetry and evolution of the lesions.<sup>1</sup>

The degree and rate of change to the retina in people with diabetes varies. Diabetic retinopathy is one of the most serious complications of diabetes—if the condition is left unmonitored and untreated, progressive damage to the retina leads to decreased visual acuity and ultimately blindness.

## **2.2 The Patient Population**

The patient population is Aboriginal and Torres Strait Islander people who have diabetes mellitus, particularly those who live in rural and remote parts of Australia.

## **2.3 The Purpose**

The primary purpose of these guidelines for evaluating and managing diabetic retinopathy is to prevent, retard or reverse visual loss, thus maintaining or improving vision-related quality of life.

## **2.4 The Goals**

These guidelines are designed to encourage ‘best practice’ on the part of health care professionals dealing with diabetic retinopathy in Aboriginal and Torres Strait Islander communities. Underlying this seeking of ‘best practice’ is the knowledge that almost all people with diabetes eventually develop diabetic retinopathy, that blindness caused by the condition can be prevented with appropriate screening and treatment, and that regular eye examinations are needed if retinopathy is to be detected early.<sup>3</sup> There are thus six goals:

- s to identify all Aboriginal and Torres Strait Islander people who have diabetes;
- s to educate and manage people who have diabetes and in this way retard the development of complications of diabetes such as diabetic retinopathy;

- s to identify Indigenous Australians at risk of blindness by providing regular screening for diabetic retinopathy;
- s to provide laser treatment for patients identified as being at risk of visual loss from diabetic retinopathy;
- s to minimise the negative consequences of treatment in order to maintain or improve vision and thus improve vision-related quality of life;
- s to achieve all of the above in a manner that is sensitive to the needs of and cultural differences among Indigenous Australians.

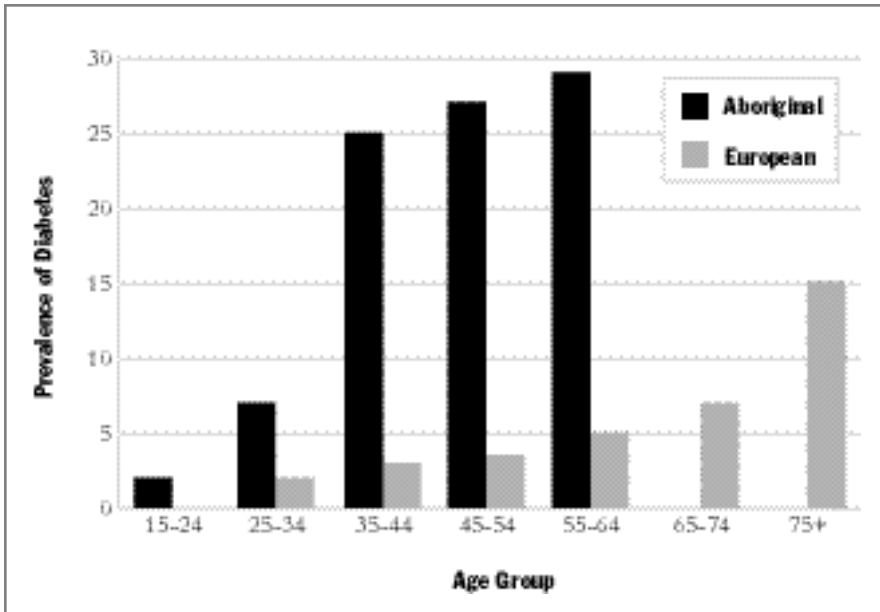
### 3 EPIDEMIOLOGY

#### **3.1 Diabetes**

There is only limited information available on the incidence and prevalence of diabetes among Aboriginal and Torres Strait Islander communities. The information available on diabetic retinopathy is even more limited.

It is estimated that diabetes occurs in 20 to 50 per cent of adults in many Indigenous communities where the diet has changed rapidly from traditional foods to the foods of an affluent, Westernised society.<sup>4</sup> Prevalence data show that the lowest rate of diabetes occurs in communities that have maintained a traditional diet and lifestyle. Overall, Indigenous communities across Australia have much higher prevalence rates for diabetes, and a much younger average age of onset, than non-Indigenous Australians.<sup>5</sup> Figure 1 shows the contrast by age group.

Figure 1. Diabetes prevalence among Australians of European origin and Indigenous Australians from 10 communities in northern and central Australia, by age, 1983 to 1995<sup>6,7</sup>



Note: There were insufficient numbers in the Indigenous cohort to include data for subjects aged 65 or more years.

### 3.2 Diabetic Retinopathy

Among Australians aged 20 to 65 years, diabetic retinopathy is now the leading cause of blindness.<sup>8</sup> Among the diabetic population, it is estimated that the prevalence of diabetic retinopathy ranges from 8 to 35 per cent.<sup>2</sup> As noted, there is very limited data on Indigenous Australians and diabetic retinopathy. A Western Australian study found, however, that 31 per cent of Indigenous people with diabetes had retinopathy, compared with 20 per cent of non-Indigenous people.<sup>9</sup> There was a higher proportion of NIDDM among the Indigenous sample and a tendency towards an earlier age of onset. Additionally, diabetic retinopathy within 10 years of onset of diabetes was more common in the Indigenous sample population than in the non-Indigenous sample. Although the study had only 134 participants, it does demonstrate that prevalence rates for diabetic retinopathy among Indigenous Australians are likely to be higher than in the non-Indigenous community.

One study of Indigenous Australians in a rural community showed

that 83 per cent of community members with diabetes had NIDDM. Diabetic retinopathy was evident in 14 per cent of those with diabetes. The mean glycohaemoglobin (HbA 1c) was 8.5 (SD=2.1) in the diabetic population, compared with 5.4 (SD=0.5) among community members without diabetes.<sup>10</sup>

In addition, Aboriginal and Torres Strait Islander people often have compounding factors such as renal disease and hypertension.

### **3.3 Risk Factors**

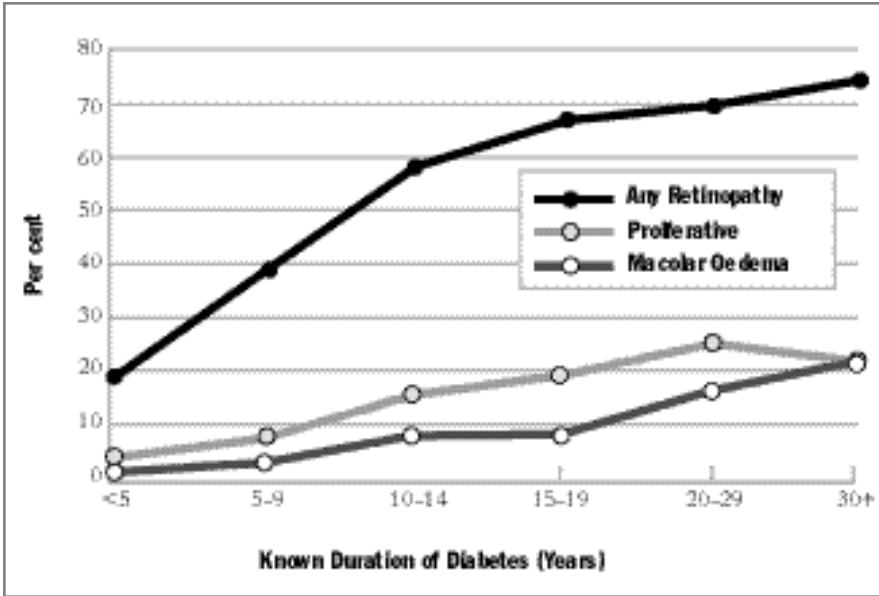
Many risk factors for the development of diabetic retinopathy have been suggested. The two main ones are the duration of diabetes and inadequate glycaemic control. Other important factors are hypertension, elevated serum lipid levels, and pregnancy.

#### 3.3.1 THE DURATION OF DIABETES

There is a strong association between the duration of diabetes—either NIDDM or IDDM—and the development and severity of diabetic retinopathy. This has been demonstrated by many studies, including one involving 5500 patients seen in Newcastle, New South Wales.<sup>11</sup> As noted, NIDDM is by far the most common type of diabetes among Aboriginal and Torres Strait Islander people. The Newcastle study found that, in patients diagnosed with NIDDM, almost 15 per cent had signs of retinopathy at diagnosis, 55 per cent after 10 years, and 70 per cent after 15 or more years. Although the Newcastle study involved mainly non-Indigenous Australians, it is likely that late diagnosis of NIDDM in Indigenous Australians would result in increased severity of diabetic retinopathy at the time of diagnosis.<sup>2</sup>

Figure 2 provides details of the Newcastle study's findings for the prevalence of any retinopathy, proliferative retinopathy and macular oedema, by known duration of diabetes.

Figure 2. NIDDM cases: prevalence of any retinopathy, proliferative retinopathy and macular oedema, by known duration of diabetes, in the Newcastle study<sup>11</sup>



### 3.3.2 GLYCAEMIC CONTROL

In patients with insulin-dependent diabetes mellitus, strict glycaemic control reduces the risk of developing diabetic retinopathy and retards its progression once the disease is established.<sup>12</sup> The Diabetes Control and Complications Trial demonstrated that the risk of developing diabetic retinopathy was reduced by 76 per cent if strict glycaemic control was maintained. In patients with early-stage diabetic retinopathy, the risk of progression of the disease was reduced by 54 per cent. There is strong evidence for this risk factor—in different communities and in varying ethnic groups<sup>1</sup>—so, despite the lack of specific studies, it is likely that Indigenous Australian communities would be similarly affected.

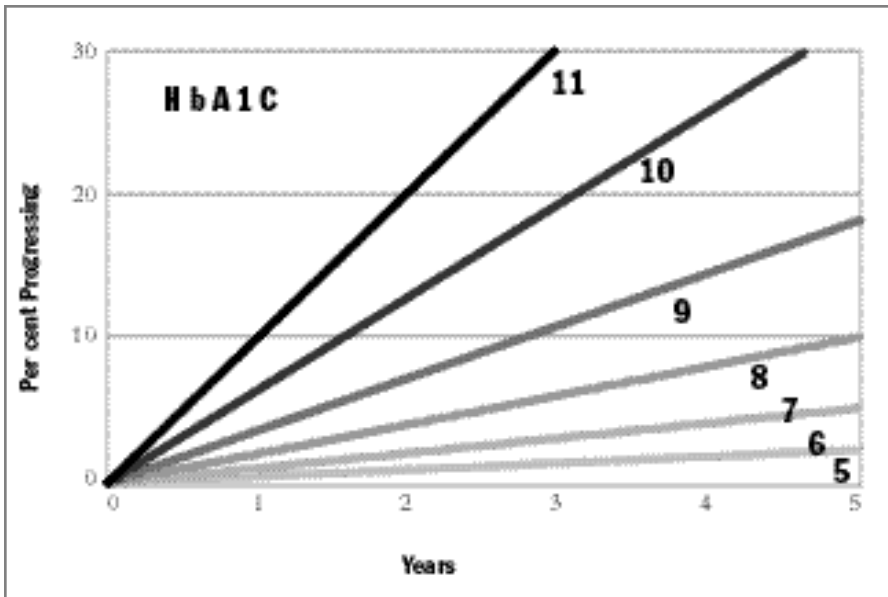
Evidence about the effects of controlling hyperglycaemia in patients with non-insulin dependent diabetes mellitus was gathered in the UK Prospective Diabetes Study<sup>13</sup>, which involved a randomised controlled clinical trial of blood-glucose control in 3,867 patients with newly diagnosed NIDDM. As with IDDM in the Diabetes Control and Complications Trial, it was found that in NIDDM patients strict glycaemic control using either sulphonylureas or insulin reduced the risk of microvascular complications. The need for retinal photocoagulation

in the intensively treated group was reduced by 29 per cent compared with those receiving conventional treatment.

*Glycaemic Control and Glycohaemoglobin*

The NHMRC guidelines state that glycohaemoglobin (HbA 1c) is considered a better measure of diabetic control than blood glucose because it is less variable and provides a measure of control over the last two or three months.<sup>1</sup> The Wisconsin Epidemiologic Study of Diabetic Retinopathy<sup>14</sup> examined the relationship between glycohaemoglobin level at baseline and the incidence and progression of diabetic retinopathy over 10 years. People with glycohaemoglobin levels in the highest quartile at baseline were about three times more likely to have progression of retinopathy than people with levels in the lowest quartile.<sup>1</sup> A similar relationship was found in the Diabetes Control and Complications Trial<sup>15</sup> (see Figure 3).

*Figure 3. Absolute risk of sustained retinopathy progression as a function of the updated mean glycohaemoglobin level during the Diabetes Control and Complications Trial and the years of follow-up*



*Note:* Estimated from Poisson regression models.

### 3.3.3 HYPERTENSION

The UK Prospective Diabetes Study examined hypertension as an independent risk factor for diabetic retinopathy in NIDDM patients. Anti-hypertensive treatment with either captopril (an angiotensin-converting enzyme inhibitor) or atenolol (a beta-blocker) was given to 1,148 patients with both diabetes and hypertension.<sup>16</sup> Unlike previous studies, the UK study found tight blood pressure control produced a clinically significant decrease in the risk of deaths related to diabetes and in the progression of diabetic retinopathy.

### 3.3.4 ELEVATED SERUM LIPID LEVELS

The Early Treatment Diabetic Retinopathy Study found that patients with elevated serum lipid levels were twice as likely to have retinal hard exudates as patients with normal cholesterol levels.<sup>17</sup> Increasing hard-exudate deposition appeared to be independently associated with an increased risk of visual impairment. This association is based on observational data, and as yet there are no completed interventional trials evaluating whether lowering the serum lipid level would reduce the risk of retinal changes in diabetes.

### 3.3.5 PREGNANCY

Pregnancy increases the rate of progression of diabetic retinopathy.<sup>18</sup> For women with no or minimal non-proliferative diabetic retinopathy (NPDR) before pregnancy, increased NPDR occurred in 12 per cent of cases, most changes regressing postpartum. Similarly, an increased progression was observed among women with NPDR before pregnancy: 47 per cent developed increased NPDR and 5 per cent developed proliferative diabetic retinopathy (PDR); of these two groups, 29 per cent regressed postpartum and 50 per cent required laser treatment. Among the group of women with PDR before pregnancy, 46 per cent progressed during pregnancy.<sup>19</sup>

*Factors associated with the risk of diabetic retinopathy<sup>20</sup>*

- s Age
- s Age at diagnosis
- s Alcohol use
- s Blood pressure or hypertension
- s Body mass index or obesity
- s Cigarette smoking
- s Contraception and pregnancy
- s Duration of diabetes
- s Ethnicity
- s Glycaemic control
- s Insulin
- s Nutritional factors
- s Serum lipids
- s Socio-economic status

*Ways of reducing the risk of developing diabetic retinopathy*

- s Tight control of blood glucose
- s Effective treatment of hypertension
- s Lowering serum lipid levels

**3.4 The Natural History of Diabetic Retinopathy**

Although almost 15 per cent of patients first diagnosed with NIDDM and less than 5 per cent of patients first diagnosed with IDDM show signs of diabetic retinopathy<sup>11</sup>, after 20 or more years of having diabetes almost all have some degree of retinopathy.

3.4.1 DEFINITIONS

Non-proliferative diabetic retinopathy is the earliest stage of diabetic retinopathy; it is visible using retinal imaging techniques and its main clinical characteristics are:

- s microaneurysms
- s retinal haemorrhages
- s hard exudates
- s cotton-wool spots
- s venous beading
- s intraretinal microvascular abnormalities (IRMA).

Proliferative diabetic retinopathy is characterised by the growth of new vessels—neovascularisation—and is indicative of more advanced diabetic retinopathy. The new vessels tend to be fragile, so they are prone to bleed, causing vitreous haemorrhage. If the new vessels fibrose and contract, this can lead ultimately to retinal detachment.

Macular oedema results from increased permeability of retinal vessels. It is called clinically significant macular oedema if the centre of the macula is involved or threatened and non-clinically significant macular oedema if the centre of the macula is not involved or threatened.<sup>3</sup>

As the disease progresses, the retinal microvasculature gradually closes, resulting in impaired perfusion and retinal ischaemia. Among the signs of increasing ischaemia are venous abnormalities (various types of beading and loops), IRMA, and more severe and extensive vascular leakage characterised by increasing retinal haemorrhages and exudation.<sup>3</sup>

Macular oedema, vitreous haemorrhage and retinal detachment all cause impaired vision. Macular oedema is the dominant cause of visual impairment resulting from diabetic retinopathy among Indigenous Australians. Prevention of visual deterioration is the main way of preserving vision since, once vision is lost, only rarely can it be restored.

#### 3.4.2 GRADING DIABETIC RETINOPATHY

In order to monitor the disease's progress and to plan management, non-proliferative and proliferative diabetic retinopathy are classified according to their degree of severity. Non-proliferative diabetic retinopathy is classified as minimal, mild, moderate and severe; proliferative retinopathy is classified as early (non-high risk) or high-risk. Table 1 lists the various stages of diabetic retinopathy and the corresponding clinical features. It should be noted, however, that the data are for Caucasian Americans and may underestimate the rate of progression of diabetic retinopathy among Indigenous Australians.

Table 1. Diabetic Retinopathy: classification into stages (Wisconsin level) and predictive value of retinal lesions<sup>1</sup>

Retinopathy Stage	Clinical Signs	RATE OF PROGRESSION (%)			
		To PDR		To High-risk Stage	
		1 yr	3 yrs	1 yr	5 yrs
<b>Minimal NPDR (level 20) (Fig. 1)</b>	<b>Isolated microaneurysms only (m)</b>	<b>Not documented</b>			
<b>Mild NPDR (level 30) (Fig. 2)</b>	<b>Microaneurysms (m)+retinal haemorrhages (h)</b>	<b>5</b>	<b>14</b>	<b>1</b>	<b>15</b>
<b>Moderate NPDR (level 40) (Fig. 3)</b>	<b>Haemorrhages and microaneurysms (h,m) in at least 1 quadrant+ cotton-wool spots (w) or venous beading in 1 quadrant only</b>	<b>12–26</b>	<b>30–48</b>	<b>8–18</b>	<b>25–39</b>
<b>Severe NPDR pre-proliferative (level 50) (Fig. 4)</b>	<i>One of the following:</i> <ul style="list-style-type: none"> <li>s <b>i (IRMA) (i) in 1 or more quadrants</b></li> <li>s <b>Venous beading (b) in 2 or more quadrants</b></li> <li>s <b>Haemorrhages/microaneurysms (h,m) in all 4 quadrants</b></li> </ul>	<b>52</b>	<b>71</b>	<b>15</b>	<b>56</b>
<b>PDR (level 60) (Fig. 5)</b>	<i>One or more of the following:</i> <ul style="list-style-type: none"> <li>s <b>Peripheral new vessels (NVE) (v)</b></li> <li>s <b>Disc new vessels (NVD) less than 1/3 of disc diameter</b></li> <li>s <b>Vitreous or preretinal haemorrhage with NVE less than 1/2 disc area</b></li> </ul>			<b>46</b>	<b>75</b>
<b>High-risk PDR (level 70) (Fig. 6)</b>	<i>One or more of the following:</i> <ul style="list-style-type: none"> <li>s <b>*NVD&gt;=1/3 disc area (v)</b></li> <li>s <b>*NVD with vitreous or preretinal haemorrhage</b></li> <li>s <b>*NVE&gt;= 1/2 disc area with vitreous or preretinal haemorrhage</b></li> </ul>	<b>Severe visual loss (VA &lt;5/200) develops in 25–40% within 2 years</b>			
<b>Macular oedema (Fig. 2)</b>	<b>Retinal oedema or thickening within 2 disc diameters of the macular centre</b>	<b>Can occur at any stage of diabetic retinopathy.</b>			
<b>Clinically significant macular oedema (Fig. 9)</b>	<b>Retinal oedema, thickening or hard exudates within 500 µm of macular centre (1/3 diameter of optic disc) or Retinal oedema or thickening 1 disc diameter or larger, any part of which is within 1 disc diameter of the centre of the macula</b>	<b>Can occur at any stage of diabetic retinopathy.</b>			

Note: Dates are for Caucasian Americans and may underestimate the rate of progression among Indigenous Australians.

## 4 Prevention and Early Detection

### 4.1 Prevention

#### 4.1.1 PRIMARY PREVENTION: DIABETES

As discussed, diabetic retinopathy occurs in people with either insulin-dependent or non-insulin dependent diabetes mellitus. Primary prevention should therefore aim at decreasing the prevalence of diabetes within Aboriginal and Torres Strait Islander communities.

To decrease the prevalence of diabetes, dietary modification and physical activity should be encouraged in the entire Aboriginal and Torres Strait Islander population, and interventions designed to achieve this should be introduced at an early age (after age 13 years).<sup>21</sup> A recent study of a Central Australian Aboriginal community, in which a community-based nutrition awareness and healthy lifestyle program had been implemented between 1988 and 1990, showed that this intervention led to an improvement in dietary habits but not to a reversal of the trend towards a growing prevalence of obesity and diabetes.<sup>22</sup> In communities where healthy food choices are limited, the role of regular physical activity in improving metabolic fitness may also need to be emphasised.<sup>22</sup>

Obtaining healthy food can be difficult in rural and remote communities. Because of the distances involved, food is more expensive than in metropolitan areas and transport can be problematic.

#### *Primary prevention of diabetes: a summary*

- s Dietary education and modification
- s Weight loss
- s Increased physical activity

#### 4.1.2 PRIMARY PREVENTION: DIABETIC RETINOPATHY

The Diabetes Control and Complications Trial results for IDDM and the UK Prospective Diabetes Study results for NIDDM demonstrated that strict glycaemic control delayed the development of diabetic retinopathy. One of the main problems associated with maintaining strict glycaemic control is the occurrence of hypoglycaemic episodes. In a rural setting where facilities are limited, this limitation can result in increased morbidity, and perhaps mortality.

The Prospective Diabetes Study also showed that treatment of hypertension delayed the onset of diabetic retinopathy in people with NIDDM. The study results emphasise the need for good control of both blood pressure and blood glucose in such people.

*Primary prevention of diabetic retinopathy: a summary*

- s Strict glycaemic control
- s Effective control of hypertension
- s Lower serum lipid levels

#### 4.1.3 SECONDARY PREVENTION: DIABETIC RETINOPATHY

The Diabetes Control and Complications Trial and the UK Prospective Diabetes Study demonstrated that, once the signs of diabetic retinopathy appear, maintaining good control of blood glucose and blood pressure retards the progression of retinopathy.

Early monitoring and laser treatment of retinal changes may be up to 98 per cent effective in preventing severe loss of vision.<sup>23</sup>

## 4.2 Screening

It is currently recommended that all Australians with diabetes have a dilated fundus examination and a visual acuity assessment at least every two years. This exam is usually performed by an ophthalmologist, optometrist or other suitably trained health professional. Except in the rare instance of diabetes onset before puberty, initial assessment should occur at the time of diagnosis.

It is recommended that screening for retinopathy in NIDDM be done at the time of diagnosis and every one to two years thereafter.<sup>24</sup>

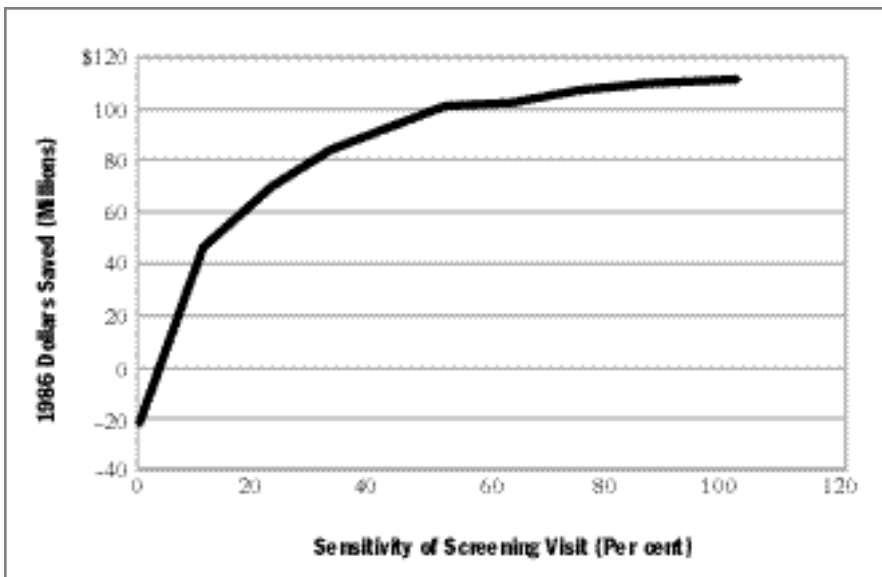
For Aboriginal and Torres Strait Islander communities in rural and remote areas, it is often difficult to comply with these recommendations. Among the particular problems are the lack of suitably trained staff to perform dilated fundus examinations, the transient nature of the health care workforce and the workers' varying levels of skill, as well as the acceptability of these methods to Aboriginal and Torres Strait Islander people. Problems also arise because of the high prevalence of concurrent eye disease.<sup>25</sup>

An alternative screening method for diabetic retinopathy involves the use of non-mydratic retinal cameras. Although the photos need to

be read by suitably trained staff, the photography can be done without dilation of the pupil and the camera can be operated after minimal training. This is a major benefit of this form of screening. Aboriginal and Torres Strait Islander people can do the screening themselves in remote parts of Australia where professional services are limited. As a result, acceptance of and compliance with screening may improve, thus increasing the number of people screened.<sup>24</sup>

A screening test needs to have greater than 60 per cent sensitivity to be most effective (see Figure 4). Lower sensitivity is compensated for by regular (yearly or two-yearly) examinations. Minor early lesions not requiring treatment may be missed at the initial examination but picked up on subsequent examinations as the disease slowly progresses.

**Figure 4. Changes in the sensitivity of a single screening visit in detecting diabetic retinopathy: 1986 dollars saved**



*Note:* This US model was based on use of dilated ophthalmoscopy annually for patients with no retinopathy and every six months for those with retinopathy.

The non-mydratic retinal camera's sensitivity in detecting diabetic retinopathy has been the subject of numerous studies. Its sensitivity is at least 80 per cent and is reported to be greater than 90 per cent in ideal circumstances.<sup>26,27,28</sup> A single Polaroid photograph is obviously non-stereoscopic and will not reveal the subtle retinal thickening that it is

necessary to see for a diagnosis of clinically significant macular oedema, but it will almost certainly show accompanying non-proliferative changes (lipid and microaneurysms) that would be the trigger for referral of such a patient. In addition, checking visual acuity in all patients will uncover those who have visual loss as a result of maculopathy in the absence of visible non-proliferative changes.<sup>29</sup>

It has been estimated that 8 to 15 per cent of patients have diabetic retinopathy that is present only outside the central 45-degree field of the non-mydratric retinal camera<sup>27</sup>; they may therefore be missed by a single photograph. But these peripheral changes alone would rarely represent high-risk retinopathy, and this shortcoming would be compensated for by regular screening. Javitt *et al.*<sup>25</sup> calculated that any detection method with greater than 60 per cent sensitivity is adequate for screening purposes, provided that screening is repeated at regular intervals. Using this criterion, the non-mydratric retinal camera is more than adequate.<sup>29</sup>

Diamond *et al.*<sup>30</sup> recently examined the effectiveness of the non-mydratric retinal camera for identifying diabetic retinopathy among Aboriginal patients in rural Western Australia. The authors concluded, "The Canon CR5-45NM non-mydratric fundus camera was relatively good at identifying diabetic retinopathy and could usefully be applied within a screening programme for treatable disease within this population." In a separate study in rural Victoria<sup>31</sup>, Aboriginal health workers were trained to use the camera and produced gradable photos in 87 per cent of patients.

If it is not possible to take adequate non-mydratric photographs—if, for example, a dark room is not available to allow for physiological dilation—it may be useful to dilate the pupils to obtain better photographs.<sup>30</sup>

#### 4.2.1 BARRIERS TO SCREENING

The National Health and Medical Research Council's recommendation on screening for diabetic retinopathy in the general diabetic population calls for a visual acuity test and fundus examination at least every two years. In the Aboriginal and Torres Strait Islander diabetic population screening is recommended annually because of the higher risk in this group.

Data from the Melbourne Visual Impairment Project showed that only 43 per cent of diabetics in the general population complied with these screening recommendations.<sup>8</sup> This poor rate of compliance suggests that there are deficiencies in primary health care recall systems, in general practitioner's examination skills, or in the referral system.<sup>21</sup>

For Aboriginal and Torres Strait Islander communities in rural and remote Australia, there are additional barriers to screening. Among these are distance from facilities and referral systems that are more likely to falter because of long delays between visiting ophthalmologists. Further, all Indigenous Australians, regardless of their location, face cross-cultural barriers.<sup>21</sup>

Screening for diabetic retinopathy is part of a comprehensive primary health care approach to the management of diabetes. The examination should be part of a yearly health assessment.

*Screening recommendations for diabetic retinopathy in Aboriginal and Torres Strait Islander communities: a summary*

- s The initial examination should be conducted at the time of diabetes mellitus diagnosis.
- s The annual examination should include:
  - visual acuity (Snellen chart) assessment  
*and*
  - dilated fundus examination by a general practitioner, physician, optometrist or ophthalmologist  
*or*
  - retinal photography by health care workers—the photos should be read by suitably trained personnel.

<i>Findings on Retinal Examination</i>	<i>Recommendations</i>
Normal screen	Repeat eye examination annually
Mild or moderate non-proliferative diabetic retinopathy	Referral to ophthalmologist but can wait until next regional visit in remote areas
Severe non-proliferative diabetic retinopathy, proliferative diabetic retinopathy or macular oedema	Immediate referral to ophthalmologist for laser treatment
Decreased visual acuity (<6/12) with normal fundus	Non-urgent referral to ophthalmologist
Ungradable photos	Non-urgent referral to ophthalmologist
Unexplained visual loss	Non-urgent referral to ophthalmologist
Media opacities	Non-urgent referral to ophthalmologist

## 5 MANAGEMENT

Management of diabetic retinopathy begins when a patient is diagnosed with diabetes mellitus. This initial contact provides the opportunity to develop a trusting relationship with the patient and to offer advice and support, as well as make an initial assessment of their eyes. It is important to clarify how regular screening will be done and to discuss the importance of annual screening to the person's future vision. For Aboriginal and Torres Strait Islander people living in rural and remote areas of Australia, the screening options are dilated fundus examination by visiting specialists or photography of the retina with non-mydratiac retinal cameras by Aboriginal health workers or other professionals.

Patients should be told that it is possible to treat diabetic retinopathy effectively and that the prognosis for their long-term vision is very good if early action is taken. They should also be told how to prevent and retard the development of diabetic retinopathy through close liaison with the primary health care team. Blood glucose levels should be kept near normal; blood pressure and serum lipids should be monitored and controlled.

It is also important to inform patients that—unlike cataract surgery, which will improve vision—laser treatment for diabetic retinopathy will not produce an immediate improvement in vision; rather, the purpose is to prevent continuing loss of vision.

Audiovisual aids need to be developed and used to teach both patients and paramedical personnel about the disease.

### 5.1 The Medical History

The initial assessment of the patient diagnosed with diabetes mellitus should include a thorough eye examination, with particular attention to those aspects relevant to diabetic retinopathy. As Figure 2 shows, 15 per cent of patients with NIDDM have some signs of retinopathy at the time of diagnosis. It may be that referral to an ophthalmologist needs to occur very early for Aboriginal and Torres Strait Islander people, who tend to be diagnosed with NIDDM at a later stage in the disease process.

In taking a medical history the following elements should be considered:

- s the duration of diabetes—the longer the patient has had diabetes, the greater the chance of diabetic retinopathy;
- s glycaemic control—glycohaemoglobin (HbA 1c) is a better indicator for long-term control than blood glucose levels;

- s blood pressure control—hypertension should be effectively treated to delay the onset and retard the progression of diabetic retinopathy;
- s serum lipid levels;
- s obesity—weight reduction will aid in the control of diabetes and microvascular disease;
- s smoking;
- s renal disease.

## **5.2 The Examination**

The eye examination should be comprehensive, with emphasis on best-corrected visual acuity and the fundus examination.

Examination of the eye allows for the grading of any diabetic retinopathy present, so that further treatment can be determined. The aim is to intervene early to prevent visual impairment, and the presence of either of the following calls for routine referral:

- s diabetic retinopathy—mild non-proliferative diabetic retinopathy or worse;
- s an unexplained decrease in visual acuity.

Immediate referral is required for the following:

- s macular oedema;
- s neovascularisation—proliferative diabetic retinopathy;
- s severe non-proliferative diabetic retinopathy—extensive retinal haemorrhages/microaneurysms, venous beading, and IRMA.

## **5.3 Fluorescein Angiography**

Fluorescein angiography involves the injection of fluorescein into the circulation so as to outline the retinal vessels. It has been used in research, and recently in randomised controlled trials, to diagnose patients, to document the adequacy of laser treatment, to identify the type and source of leakage on the retina, and to assess compliance with treatment protocols.<sup>32</sup>

The National Health and Medical Research Council's guidelines for diabetic retinopathy<sup>1</sup> suggest that the routine use of fluorescein angiography in managing retinopathy should be guided by clinical experience because there is little available evidence on which to base firm guidelines. The technique is recommended if macular oedema is present, to identify the source of perimacular leakage and to guide focal and grid laser treatment.

Aboriginal and Torres Strait Islander people in rural and remote parts of Australia may have difficulty gaining access to fluorescein angiography. In any case, experienced clinicians can manage patients without the need for this form of investigation.

Further, although fluorescein angiography is a reasonably safe procedure, the following side-effects do occur:

- s nausea;
- s vomiting;
- s allergic skin reactions—urticaria;
- s allergic reaction to fluorescein dye—resuscitation equipment should always be on hand when performing the angiogram;
- s dizziness;
- s chest pain;
- s myocardial infarction;
- s asystole;
- s death.

## **5.4 Management and Treatment**

The grading of the retinal changes that are seen on fundus examination determines the management and treatment of patients with diabetic retinopathy. In general, if the changes are minimal, annual screening is all that is required until the retinopathy worsens.

### 5.4.1 EQUIPMENT AND FACILITIES

Assessment and treatment of diabetic retinopathy by laser is best done in a darkened room that has an adequate and continuous electrical supply. It is highly recommended that there be available a high-quality slit lamp with high-quality and robust optics combined with a compatible laser-delivery system. Patient and health professional should be seated, preferably on comfortable, adjustable stools.

Nevertheless, it is possible to provide safe treatment under sub-optimal conditions.

### 5.4.2 LASER TREATMENT

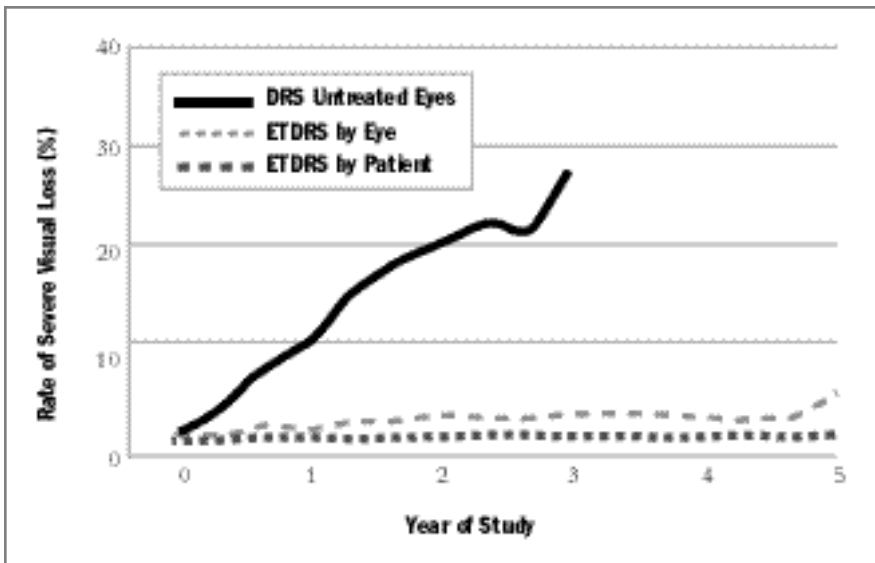
Immediate treatment is necessary for patients with macular oedema or proliferative diabetic retinopathy, or both. Treatment should also be considered for patients with severe non-proliferative diabetic retinopathy. In addition, if compliance with follow-up is likely to be poor, or if the patient has cataracts or is pregnant, treatment should not be delayed.

Laser surgery (retinal photocoagulation) is the main treatment used for diabetic retinopathy. The Diabetic Retinopathy Study (DRS) and Early Treatment Diabetic Retinopathy Study (ETDRS) trials have shown conclusively that timely laser treatment is effective in patients with both proliferative diabetic retinopathy and clinically significant macular oedema.<sup>1</sup> The significant improvement in outcome demonstrated in the ETDRS was achieved by stringent adherence to the laser-treatment recommendations as well as close follow-up with re-treatment as needed.

The patient's consent should be obtained before laser therapy.

Figure 5 shows rates of severe visual loss (visual acuity less than 5/200), assessed at each study visit after proliferative diabetic retinopathy was diagnosed, for untreated eyes in the DRS compared with treated eyes (or patients) in the ETDRS. Although the risk of severe visual loss for untreated DRS eyes at three years approached 30 per cent, only 4 per cent of treated eyes in the ETDRS had reached severe visual loss by five years and only 1 per cent of patients had this degree of visual loss in both eyes.<sup>23</sup>

**Figure 5. Proliferative diabetic retinopathy: proportion of untreated eyes in the Diabetic Retinopathy Study developing severe visual loss compared with treated eyes and patients in the Early Treatment Diabetic Retinopathy Study<sup>23</sup>**



Note: Severe visual loss = visual acuity less than 5/200.

## 5.4.3 THE TYPE AND EXTENT OF LASER TREATMENT

*Focal treatment for clinically significant macular oedema*

For macular (focal) treatment, use small spot-sized (100-micron) focal laser burns applied directly to leaking microaneurysms and in a grid pattern to areas of diffuse leakage or retinal thickening, or both. Direct treatment of microaneurysms should result in a colour change (whitening or darkening) of the microaneurysms. Grid-pattern burns should be of mild intensity, spaced more than one burn-width apart, and no burns should occur closer than 500 microns from the centre of the macula.

*Panretinal photocoagulation treatment (PRP) for proliferative retinopathy or severe non-proliferative diabetic retinopathy*

For panretinal photocoagulation treatment, the Early Treatment Diabetic Retinopathy Study recommended 500-micron moderate-intensity burns placed approximately half a burn-width apart, from the posterior fundus to the equator. Treatment with panretinal photocoagulation is usually divided into two or more sessions per eye. Standard treatment should total 1200–1600 burns, not closer than two disc diameters from the centre of the macula.

If both clinically significant macular oedema and proliferative diabetic retinopathy are present in the same eye, it is important to apply focal treatment for the former before starting PRP. If clinically significant macular oedema and high-risk proliferative diabetic retinopathy are present in the same eye, both focal treatment and panretinal photocoagulation treatment should be applied in the first session.

## 5.4.4 SIDE-EFFECTS AND COMPLICATIONS OF LASER TREATMENT

Patients should be advised that not all their treatment can be carried out at one time or in one place.

The most frequent side-effect of laser therapy is discomfort or pain during panretinal photocoagulation treatment; in some cases peribulbar anaesthesia is necessary.

After treatment, transient blurring of vision, for days or weeks, is also common.

Longer term visual reduction may result from exacerbation of macular oedema in some patients. This effect can be minimised by treating any macular oedema before starting panretinal photocoagulation treatment, as recommended by the Early Treatment Diabetic Retinopathy

Study.<sup>33</sup> There is also a slight risk of damage to the macula from inadvertent foveal contact or from subsequent migration of laser-treatment scars.<sup>34</sup>

Increased sensitivity to glare and difficulty with light–dark adaptation are also common in patients with diabetic retinopathy: these problems may become more severe after laser treatment.

No increased risk of cataract has been reported from laser treatment.<sup>1</sup>

Be wary of attempting to ‘overtreat’ in one session: exudative retinal detachment and other complications can occur.

#### 5.4.5 VITREORETINAL SURGERY

Patients requiring vitreoretinal surgery should be appropriately referred.

### 5.5 Follow-up

Close follow-up, and re-treatment as necessary, after laser treatment for diabetic retinopathy were important factors in achieving the significant improvement in outcome observed in the Early Treatment Diabetic Retinopathy Study.

#### *Laser Treatment Follow-up: a Summary*

- s After focal treatment:
  - Review at two to four months.
  - Repeat focal treatment if significant retinal thickening persists at four months.
- s After panretinal photocoagulation treatment:
  - Review at two to four months.
  - If new vessels are stable or regressing, treatment may be adequate and the patient should be reviewed at four months.
  - If new vessels worsen, further panretinal photocoagulation treatment is necessary.

Table 2. Management Recommendations<sup>1</sup>: a Summary

Retinopathy Stage	Focal or Grid Laser	Panretinal Laser	Follow-up (months)
MILD OR MODERATE NON-PROLIFERATIVE DIABETIC RETINOPATHY			
<b>No macular oedema</b>	<b>No</b>	<b>No</b>	<b>6–12</b>
<b>Early macular oedema</b>	<b>Sometimes</b>	<b>No</b>	<b>4–6</b>
<b>Clinically significant macular oedema</b>	<b>Yes</b>	<b>No</b>	<b>2–4</b>
SEVERE NON-PROLIFERATIVE DIABETIC RETINOPATHY			
<b>No macular oedema</b>	<b>No</b>	<b>Sometimes<sup>a</sup></b>	<b>2–4</b>
<b>Early macular oedema</b>	<b>Sometimes</b>	<b>Sometimes, after focal or grid laser</b>	<b>2–4</b>
<b>Clinically significant macular oedema</b>	<b>Yes</b>	<b>Sometimes, after focal or grid laser</b>	<b>2–4</b>
PROLIFERATIVE DIABETIC RETINOPATHY			
<b>No macular oedema</b>	<b>No</b>	<b>Yes</b>	<b>2–4</b>
<b>Early macular oedema</b>	<b>Yes</b>	<b>Yes, after focal or grid laser</b>	<b>2–4</b>
<b>Clinically significant macular oedema</b>	<b>Yes</b>	<b>Yes, after focal or grid laser</b>	<b>2–4</b>
HIGH-RISK PROLIFERATIVE DIABETIC RETINOPATHY			
<b>No macular oedema</b>	<b>No</b>	<b>Yes</b>	<b>2–4</b>
<b>Early macular oedema</b>	<b>Yes</b>	<b>Yes</b>	<b>2–4</b>
<b>Clinically significant macular oedema</b>	<b>Yes</b>	<b>Yes</b>	<b>2–4</b>

*a.* Consider panretinal photocoagulation treatment if compliance with a follow-up regime is likely to be poor or if the patient has cataracts or is pregnant.

## 6 CATARACT SURGERY AND DIABETIC RETINOPATHY

For people who have both cataracts and diabetic retinopathy, current opinion recommends adequate laser treatment of significant retinopathy before cataract surgery. Treatment of any macular oedema or threatened maculopathy should be with focal or grid laser.<sup>1</sup>

The reason for treating diabetic retinopathy before cataract surgery is that pre-operative retinopathy, particularly maculopathy, influences the visual outcome after cataract surgery as a result of asymmetric retinopathy progression in the operated eye. This progression leads to an increased risk of rubeosis iridis or neovascular glaucoma.<sup>1</sup>

Sometimes it is necessary to remove the cataract to complete the laser treatment. The laser treatment should be completed as soon as possible after cataract surgery.

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**Part 2**

**Cataract**

## 1 INTRODUCTION

This document provides guidelines specifically for the management of cataract in Aboriginal and Torres Strait Islander communities in rural and remote parts of Australia. The Royal Australian College of Ophthalmologists has developed clinical practice guidelines for cataract surgery in mainstream services.<sup>1</sup>

Cataract surgery is the main type of eye surgery Indigenous Australians need. Although the absolute number of cases is small, untreated cataract can result in considerable personal suffering and community loss.

Compared with non-Indigenous Australians, cataract surgery is usually performed on Indigenous Australians when the cataract is at a more advanced stage. Further, Indigenous Australians often face a variety of difficulties—distance, lack of transport, lack of medical services, language barriers and economic disadvantage, for example—when seeking out services.

These guidelines are designed to lead to improvements in the quality of surgical outcomes for Indigenous Australians. Although they are primarily for use by ophthalmologists, they are also suitable for Aboriginal and Torres Strait Islander health workers and other professionals involved in cataract surgery in rural and remote settings.

The guidelines were developed using:

- s the best available scientific data based on clinical trials and the evaluation of available evidence;
- s the recommendations in the report *Eye Health in Aboriginal and Torres Strait Islander Communities*<sup>2</sup>;
- s contributions by Dr. Garry Brian and ophthalmologists experienced in working with Aboriginal and Torres Strait Islander communities;
- s contributions by the National Aboriginal Community Controlled Health Organisation, Aboriginal and Torres Strait Islander health workers, officers of the Department of Health and Aged Care, and representatives of the Optometrists Association of Australia and the Royal Australian College of Ophthalmology.

It is understood that the pattern of practice described in these guidelines might need to be modified in particular circumstances. Further, the guidelines should not be interpreted as being inclusive of all proper methods of care or exclusive of other methods of care reasonably directed at obtaining the best result for a particular person.

## 2 BACKGROUND

### 2.1 Definition

A cataract is an opacity in the lens of the eye; it leads to a loss of visual function.

There are three cataract conditions: cortical cataract, nuclear cataract, and posterior subcapsular cataract. Each condition has its own pathology, occurs in anatomically different areas of the lens, has a different age of onset, and appears to have different risk factors. One condition can occur alone or in combination with one or both of the others. They all affect vision, however, and surgical treatment and management techniques are the same.

### 2.2 The Patient Population

The patient population is Aboriginal and Torres Strait Islander people who have cataract, particularly those who live in rural and remote parts of Australia. They may have a variety of characteristics:

- s English as a second or third language, if it is spoken or understood at all;
- s no previous experience or knowledge of hospitals or surgery;
- s poor previous experience of hospitals (for example, racism on the part of staff) or surgery (for example, a poor outcome because of post-operative non-compliance or inadequate pain relief resulting from an inability to communicate adequately with staff) and anxiety or fear as a result;
- s limited experience of cataract surgery, involving knowledge of a person who suffered the trauma of travel to a major metropolitan hospital or had a poor surgical outcome, and understanding this to be the norm;
- s fears about the hospital (for example, if relatives have died there) or the town in which it is situated (for example, racism or clan or family matters);
- s anxiety about being isolated from family and land, particularly if the patient is elderly and considers death a possibility while away from home;
- s a different world view, with differing expectations about the need for surgery, attendance on the day arranged, punctuality, and compliance with medication requirements;

- s poor general health;
- s the need for someone to accompany them, with the added organisation and expense that this entails;
- s limited financial resources.

### **2.3 The Aim of Cataract Surgery**

The aim of cataract surgery is to achieve a rapid, stable recovery of vision to the preferred refractive status with minimal morbidity and risk.

### **2.4 The Goal**

The goal of these guidelines is 'best practice' in the management of cataract and intraocular lens surgery in Aboriginal and Torres Strait Islander peoples, particularly those living in rural and remote regions where access to specialist eye health professionals and hospital care is limited. To achieve this goal, the following are minimum requirements:

- s identify the presence of cataract;
- s assess the impact of the cataract on the patient's visual and functional status and their quality of life;
- s advise the patient about cataract's impact on vision, functional activity and natural history, as well as the benefits and risks of, and alternatives to, surgery, so that they can make informed decisions about treatment options;
- s establish criteria for a successful treatment outcome with the patient;
- s perform surgery when it is expected that this will improve the patient's functional activity and when the patient chooses this option;
- s provide the necessary post-operative care and rehabilitation and treat any complications;
- s achieve all of the above in a manner that respects the individual preferences of Aboriginal and Torres Strait Islander people and facilitates individual and community involvement.

### 3 EPIDEMIOLOGY

#### **3.1 Cataract**

Worldwide, cataract is the leading cause of blindness; in Australia, it remains an important cause of blindness and visual impairment. Each year 120,000 cataract operations are performed in Australia, and cataract accounts for 8 per cent of legal blindness (4,800 out of 62,500 people who are legally blind) and 9 per cent (36,000) of the 398,000 Australians who have less than driving vision.

Between 1985 and 1994 the number of cataract operations performed in Australia increased 2.6 times.<sup>2,3</sup> Between 1995 and 2000 the rate increased a further 1.8 times, to give an overall increase of 4.6 times in the last 16 years. The rate of cataract surgery varies greatly from State to State, although the variation is not directly related to the number of ophthalmologists in each State.<sup>2,3,4</sup> Significant geographic variation has also been observed in the United States.

There has been no systematic assessment of the prevalence of cataract among Indigenous Australians since the National Trachoma and Eye Health Program survey conducted between 1976 and 1978. That study reported an overall prevalence of lens abnormalities of 3.6 per cent among Aboriginal people, compared with 0.8 per cent among non-Aboriginal people. After adjustment for differences in the age structures of the Aboriginal and non-Aboriginal populations, lens abnormalities were reported to be twice as common among Aboriginal people.

Although the age-specific prevalence of cataract is relatively high, the absolute number of Indigenous Australians with cataract is relatively small and, if there is no surgical backlog, the number of people needing surgery each year is small. Nevertheless, if the rate of cataract surgery among Indigenous Australians were to be the same as for non-Indigenous Australians, about 2,400 cataract operations would need to be performed each year in the Indigenous population.<sup>5</sup>

The only recent data on cataract among Aboriginal and Torres Strait Islander peoples come from health services. The data are particularly vulnerable to selection bias for surgery.<sup>2</sup>

#### **3.2 Risk Factors**

The single most important risk factor for cataract is increasing age. Data from the Visual Impairment Project<sup>6</sup> are representative of data from other population-based studies. They show that the prevalence of

cataract increases dramatically after the fifth decade (ages 41–50). By the eighth decade (ages 71–80), half of all people will have significant cataract, and by the tenth decade (91–100) everyone will be affected. Similarly, the proportion who have had cataract surgery doubles with each decade, until every second person in their 90s will have had cataract surgery.

Among other important risk factors for cataract are exposure to ultraviolet-B and ionising radiation, a lack of dietary anti-oxidant vitamins, the presence of diabetes, ocular trauma, the occurrence of severe diarrhoea and dehydration, and the use of therapeutic drugs such as steroids and recreational drugs such as cigarettes and alcohol.

#### 4 PREVENTION

At present there is no proven medical treatment available to prevent the formation or progression of age-related cataract. Although poor nutrition is thought to be a risk factor, research published to date does not support the use of nutritional or vitamin supplements for the prevention or treatment of cataract. Until the results of current studies of the effectiveness of anti-oxidant vitamin supplements become available, the only effective protective interventions to reduce the risk of developing cataract are to reduce ocular exposure to ultraviolet-B radiation and to stop smoking.

#### 5 SERVICE DELIVERY

##### **5.1 Surgical Eye Care in Rural and Remote Settings**

Rural and remote settings are generally characterised by:

- s the lack of a resident ophthalmologist;
- s delivery of routine ophthalmic care by a visiting ophthalmologist during periodic visits to a patient's community or a nearby one;
- s no easy access to specialist ophthalmic care at times other than during ophthalmologists' visits, because of distance, the patient's inability or unwillingness to travel, or the difficulty or cost of travel;
- s ophthalmic equipment, especially the slit lamp, often not being of a quality similar to that usually applying in an urban setting;

- s reliance on other health professionals—who may also be itinerant (for example, an optometrist or a flying doctor) or have limited ophthalmic training (for example, a clinic nurse or an Aboriginal of Torres Strait Islander health worker)—to provide intermediary or substitute ophthalmic care in the absence of the itinerant ophthalmologist.

Although consultations and treatments such as laser photocoagulation for diabetic retinopathy can be provided in a patient's community, cataract surgery should occur in nearby regional towns, so that acceptable surgical facilities are available and travel and social dislocation are minimised for the patient.

### **5.2 Hospital Access in Rural and Remote Areas**

Cataract surgery currently occurs in country hospitals that may have the following characteristics:

- s a high turnover of medical and nursing staff and a consequently poor procedural memory;
- s only occasional cataract surgery sessions and thus limited procedural experience;
- s inadequate or limited surgical equipment.

Ideally, cataract surgery should only occur in a hospital that:

- s meets the relevant standards of accreditation, particularly in relation to instrument sterilisation and infection control;
- s has at least one medical officer who is on site (but not necessarily in the operating theatre) during surgery and who is capable of patient resuscitation—a specialist anaesthetist is not necessary;
- s has the capacity and willingness to transfer surgical patients to a metropolitan hospital should an intra-operative complication (for example, nucleus dropped into vitreous humour) or immediate post-operative complication (for example, endophthalmitis) occur.

### **5.3 Aboriginal Community–Controlled Health Services**

In the search for better health outcomes, Aboriginal community–controlled health services represent an important source of assistance for patients, communities and health care specialists. The health service, and Aboriginal and Torres Strait Islander health workers, can:

- s provide primary health care services;
- s offer support and help to meet individual, family and community needs;
- s accompany patients to regional health centres for specialist consultations;
- s arrange transport;
- s help to determine whether the potential visual improvement outweighs the potential risk, cost and inconvenience of surgery;
- s liaise between the patient, medical officers (the flying doctor), the ophthalmologist and the regional hospital;
- s maintain accurate patient records.

## 6 MANAGEMENT

### **6.1 Diagnosis**

The impact of cataract on a patient's functioning can be determined in a number of ways, among them Snellen visual acuity, contrast sensitivity, glare disability or self-assessment of functional status or difficulty with vision. There is, however, no single test that adequately describes the effect of cataract on a patient's visual status or functional ability or defines the threshold for performing cataract surgery.

Subjective measures of visual disability—as reported by the patient, the person accompanying the patient, or an informed health worker from the patient's community—may be more important in determining whether an offer of cataract surgery should be made to a particular patient.

The physical examination requires that a range of subjective factors be taken into account.

### **6.2 Outcomes**

The successful outcome of surgery is restoration of the functional loss that the patient experienced before having surgery. Improved visual function after cataract surgery and improved health-related quality of life have been widely reported.<sup>7,8,9</sup> The traditional outcome measure for cataract surgery has been Snellen visual acuity, and cataract extraction gives excellent outcomes.

Loss of visual function in the elderly is associated with a decline in physical and mental functioning and in independence with the activities of daily living. Improved visual function following cataract surgery can retard the progressive deterioration of quality of life normally seen in elderly patients. Cataract surgery can thus play an important part in preserving function and preventing disability in at-risk patients.<sup>10</sup>

Cataract surgery has been shown to have a significant impact on vision-dependent function. At least 90 per cent of patients undergoing first-eye cataract surgery noted an improvement in functional status<sup>11</sup> and satisfaction with vision, and 80 per cent of elderly patients with co-existing ocular and medical diseases reported improved visual function. The pooled percentage of eyes with post-operative best corrected visual acuity of 6/12 or better was 95 per cent among patients with no ocular co-morbidity and 90 per cent for all eyes undergoing cataract surgery.<sup>11</sup>

### **6.3 Second-Eye Surgery**

In patients with bilateral cataract-induced visual impairment, cataract surgery in both eyes is an appropriate treatment for restoring binocular vision. A number of studies in the United States and the United Kingdom<sup>12,13,14,15</sup>, comparing the outcomes of first- and second-eye surgeries after extracapsular cataract extraction, concluded that patients who underwent surgery in both eyes had greater improvement in visual acuity and functional status than did those who underwent surgery in one eye.

The indications for second-eye cataract surgery are the same as those for the first-eye surgery. Where it is possible, a suitable time period after the first-eye surgery should be allowed, so that any immediate post-operative complications that occur can be treated before second-eye surgery.

### **6.4 The Physical Examination**

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

- s to diagnose or confirm the presence of the cataract;
- s to confirm that the cataract is a significant factor related to the visual impairment and symptoms described by the patient;
- s to exclude or identify other ocular or systemic conditions that might contribute to the patient's visual impairment or affect the surgical plan or ultimate outcome.

The ophthalmic examination should document the status of both eyes. It should include the following components:

- s a patient history—including the patient’s own assessment of functional status;
- s Snellen acuity and refraction;
- s measurement of intraocular pressure;
- s assessment of pupillary function;
- s examination of ocular motility;
- s external examination;
- s undilated and dilated slit-lamp examination;
- s dilated examination of the fundus;
- s keratometry and axial-length measurements.

Immediately before the surgery, 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. Primary health care providers should be encouraged to contact the ophthalmologist if they notice a change in visual symptoms in the interval between the examination and the surgery.

The past ocular history should be included in the work-up because previous records may not be available in the hospital.

### **6.5 Surgical Management**

Cataract surgery is recommended when a patient with cataract-induced visual loss is no longer able to function adequately with his or her present level of vision and surgery offers a reasonable likelihood of improved visual function. Generally, the threshold of visual impairment for which surgery is justified and appropriate for someone who drives a motor vehicle occurs when:

- s a cataract significantly contributes to, or solely causes, a best corrected Snellen acuity of 6/12 or worse;
- or
- s the patient fails to meet the visual criteria for retention of a motor vehicle driver’s license.

The ophthalmologist and the Indigenous health care worker can help to explain the risks of cataract surgery to the patient. It may take some time to secure the patient’s trust.

Cataract surgery in rural and remote settings is potentially accompanied by higher risks should complications occur. The decision to advise a particular patient to proceed with cataract surgery should be made after all factors have been considered and the individual benefits for the patient are felt to outweigh the risks. The decision whether or not to proceed will vary from patient to patient, depending on a variety of circumstances, including:

- s added risks should complications occur;
- s the patient's age and general health;
- s the patient's home conditions, including family circumstances;
- s the patient's daily activities, such as employment, hobbies and family care responsibilities;
- s the health of the eye apart from cataract.

Cataract surgery should usually be performed as a day surgery procedure. There will, however, be some medical or social circumstances where hospitalisation is required.

#### 6.5.1 CATARACT SURGERY IN A MONOCULAR PATIENT

For a monocular patient—that is, a patient who is legally and permanently blind in one eye only—the indications for cataract surgery are the same as for a binocular patient. The threshold of visual disability for intervention may, however, be higher than that for the binocular patient. The ophthalmologist and the Indigenous health worker should discuss with the patient the risk of total blindness if severe complications occur.

#### 6.5.2 OTHER INDICATIONS FOR CATARACT SURGERY

There are two other indications for cataract surgery:

- s the need to see the fundus for treatment of retinal disorders and the management of intraocular pathology;
- s the presence or risk of lens diseases—phacolytic glaucoma, uveitis or subluxated/dislocated lenses.

### **6.6 Contra-Indications for Cataract Surgery**

Surgery for visually impairing cataract should not be performed in the following circumstances.

- s the patient does not want surgery.
- s the patient is a child.

- s the patient needs a special variant of surgery involving equipment or expertise not available locally.
- s glasses or visual aids provide satisfactory functional vision.
- s surgery will not improve visual function (unless there are other indications for surgery present, see 6.5.2).
- s the patient is medically unfit.
- s legal consent cannot be obtained.
- s the patient is unable to obtain adequate post-operative care.

### **6.7 Pre-operative Preparation**

A recent study in the United States showed no benefit from routine medical tests before cataract surgery.<sup>16</sup> A standard battery of tests—electrocardiography, complete blood count, serum electrolytes, urea nitrogen, creatine and glucose—did not alter morbidity. The authors concluded that, unless there is a known pre-existing condition that would require close monitoring, routine medical testing before cataract surgery is neither needed nor justifiable. There are no data on the value of such testing in Australia.

The ophthalmologist who is to perform the surgery has the following responsibilities:

- s to examine the patient pre-operatively—this could be done the day before surgery—to confirm that nothing has occurred since the patient was last seen that calls for a change to the management plan or makes surgery inappropriate;
- s in the pre-operative consultation, to again explain the sequence and detail of pre-operative care, anaesthesia, surgery, and post-operative care;
- s to inform the patient about the risks, benefits and expected outcomes of surgery. If the indication for surgery is not primarily visual rehabilitation, the immediately pre-operative consultation should be used to reinforce this for the patient and any immediate family, other relatives, health workers, or other people accompanying the patient;
- s to obtain the patient's informed consent;
- s to ensure that keratometry and A-scan measurements have been taken if an intraocular lens is to be implanted;

- s to choose the appropriate lens power when intraocular lens implantation is planned;
- s to formulate a surgical plan—anaesthesia, desired wound placement and construction, desired refractive results, and expected post-operative refraction;
- s to review the results of pre-surgical and diagnostic evaluations with the patient or, as necessary, with a responsible adult acting for the patient.

Use of audiovisual aids should be encouraged as a means of informing the patient.

Clinical notes on the assessment of the prospective patient should be left in the patient's clinic notes, where they will be available to the patient's primary care physician (for example, the flying doctor) and other health professionals (for example, the Indigenous health workers and staff of the health service) if the consultation occurred in the community. The notes should also be sent to the patient's primary care physician if the consultation occurs other than in a community health facility. In addition, they should be entered into the patient's medical records.

To facilitate post-operative follow-up, the ophthalmologist should maintain a database of patients who have undergone cataract surgery. Although the ophthalmologist is responsible for the examination and the review of data, certain aspects of data collection may be carried out by another trained individual under the ophthalmologist's supervision.<sup>17</sup>

## **6.8 Management of the Pre-Operative Patient**

A number of things can be done to help the pre-operative patient.

### 6.8.1 SCHEDULING

The patient should be consulted about the proposed location for surgery to ensure that it is socially and culturally acceptable. The patient's name should be added to the waiting list of the surgical facility that is as close as practicable to their community.

When several patients from one community are to have surgery and must travel to the surgical facility, it may be useful to book these people onto a single operating list: the presence of familiar community members may allay fears about the experience and the cost of transport will be less if there is a group of patients. It is important to bear in mind that an unforeseen community event—for example, a funeral—may

lead to the whole group's absence, with many consequences for the operating list. Suitable escorts should be found to provide assistance with, say, elderly patients or minors.

When the date of surgery has been decided, the patient should be informed directly; by mail if that is possible and the patient is literate or in person or by telephone, if one is available.

The health professionals in the patient's community, and the regional eye health coordinator if there is one, should also be informed, since they will probably have to organise and facilitate the patient's attendance at surgery and to monitor post-operative progress. The hospital liaison officer, if there is one, should also be informed, since he or she will be responsible for organising and coordinating peri-operative attendance and explaining the processes and details of care.

The patient, often with an accompanying person, should be transported to the surgical facility on the day before surgery, to allow:

- s confirmation of attendance;
- s the patient to familiarise himself/herself with the facility, staff and processes of treatment;
- s a further ocular assessment prior to surgery;
- s the patient's informed medical and financial (if applicable) consent to be confirmed and documented;
- s general medical aspects of the patient's care to be attended to—for example, use of diabetic medications on the morning of surgery;
- s assessment of the patient's general health, outlook and well-being, with confirmation of their probable ability to cope with day surgery;
- s accommodation with relatives or in a hostel, motel or similar establishment to be organised.

#### 6.8.2 THE DAY OF SURGERY

On the day of surgery the patient should do the following:

- s take a light breakfast, anti-hypertensive medications as usual, and diabetic and anti-coagulation medications as instructed;
- s be transported to the surgical facility;
- s be admitted as a 'day case', according to the facility's protocol;

- s undergo baseline observations according to the facility's protocol—for example, blood pressure and blood sugar level;
- s follow the facility's preparation protocol for entry to the operating theatre—this may mean simply donning clean disposable hat, shoes and gown over everyday wear or it may also require a face wash or, at maximum, showering with an antiseptic wash and a complete change into theatre attire;
- s have the eye for surgery prepared;
- s await surgery in comfortable seating close to the operating theatre;
- s not have dentures, hearing aids or limb prostheses removed prior to entering the theatre suite.

Given the often high turnover of staff in rural and remote hospitals, with the resultant loss of institutional memory and the difficulties this creates for occasional surgical lists, protocols for management of the pre-operative cataract patient may be compiled and updated for the use of new staff and the convenience of patients and the surgeon.

### 6.8.3 PATIENTS WITH DIABETES

Many diabetic patients have impaired glycaemic control and so it is generally easier and safer to have such patients take a light breakfast and omit diabetic medication on the morning of surgery, to confirm that the blood sugar level is satisfactory at admission to the surgical facility, to complete the surgery, and then to have the patient eat and take his or her usual medication.

## **6.9 The Surgical Setting**

Nearly all cataract surgery is performed in a day surgery setting. Inpatient surgery may be necessary if there is a need for complex ocular care, multiple procedures or general medical and nursing care, or because of the presence of multiple ocular conditions.

## **6.10 Anaesthesia**

A variety of anaesthesia techniques are used for cataract surgery—general and local or regional (for example, retrobulbar, peribulbar, periocular subtenants injection, topical and intracameral). Sedation is sometimes used with regional or topical anaesthesia to minimise pain, anxiety and discomfort.

The type of anaesthesia chosen will depend on many factors, among them the surgical technique, the patient's health status, and the demands and constraints of the rural and remote setting. Because of the systemic risks associated with general anaesthesia, especially in elderly people with cardiac or pulmonary conditions, regional anaesthesia is generally recommended. General anaesthesia is now used in less than 4 per cent of cataract procedures.<sup>18</sup> The type of anaesthesia does not affect the outcome of cataract surgery.

All patients undergoing cataract surgery should have their history taken and a physical examination to identify any risk factors before undergoing either anaesthesia or sedation.

### **6.11 Use of Antibiotics**

A 5 per cent solution of povidone iodine placed in the inferior conjunctival sac before surgery has been associated with a reduction in bacterial colony counts taken from the ocular surface at the time of surgery and a reduced rate of post-operative endophthalmitis.<sup>19</sup>

The benefits of using prophylactic antibiotics before surgery are not entirely clear. No studies have convincingly demonstrated the effectiveness of antibiotics in reducing the risk of endophthalmitis, but there is evidence to support an association between the use of pre-operative antibiotics on the day of surgery and a reduction in ocular surface bacterial colony counts.<sup>20</sup> No studies have demonstrated the efficacy of antibiotics placed in the infusion solution for preventing endophthalmitis. There are, however, risks of toxicity as a result of dilutional errors if this is done.

There is no evidence that in humans subconjunctival antibiotics are superior to topical antibiotics at the close of surgery. Further, administration of subconjunctival antibiotics at the close of surgery has been associated with risks, among them macular infarction with the use of aminoglycosides.<sup>21</sup>

### **6.12 Dealing with Pre-Existing Ocular Conditions**

#### 6.12.1 TRAUMA

In eyes that have experienced trauma of some kind, post-traumatic zonular rupture should be specifically looked for and excluded.

### 6.12.2 PSEUDOEXFOLIATION

In patients with pseudoexfoliation, or PXF, the pre-operative assessment should specifically look for glaucoma, iridodonesis, phacodonesis and the extent of pupil dilation. Increased risk of lens dislocation, capsular rupture and vitreous loss have been noted in such patients. Surgical approaches should provide for adequate pupillary dilation and minimise stress on the zonules.<sup>22</sup> PXF is common in some Indigenous communities, especially in Central Australia and Western Australia. Its presence is not associated with glaucoma.

## 6.13 Dealing with General Medical Conditions

### 6.13.1 DIABETES

For patients with diabetes, it is important to coordinate care with the primary care physician or endocrinologist. On the day of surgery, insulin-dependent patients' blood glucose should be checked. If necessary, measures should be taken to stabilise the condition; only then should it be decided whether or not to perform the surgery.

The severity of retinopathy is a major determinant of post-operative visual acuity among patients with diabetes.<sup>23</sup> Cataract surgery may be indicated to improve visual function or to assess and treat the retinopathy. For these patients, there is an increased risk of endophthalmitis, macular oedema, iritis, keratitis, rubeosis iridis, neovascular glaucoma and vitreous haemorrhage.<sup>24</sup> In addition, cataract surgery may worsen or accelerate retinopathy, and it often worsens co-existing macular oedema. It is thus important to pay attention to early post-operative assessment and treatment of maculopathy and neovascularisation.

Wherever possible, diabetic retinopathy requiring retinal laser photocoagulation should be treated as thoroughly as possible before cataract surgery.<sup>25</sup>

### 6.13.2 ANTI-COAGULANTS

At present there is no clear evidence for the best way to manage patients taking anti-coagulants. Intraocular surgery on such patients has been conducted safely, and cessation of taking anti-coagulants may be associated with systemic morbidity. Individual circumstances, including the reason for taking anti-coagulants, should be reviewed to determine the best type of anaesthesia, the surgical technique and the timing of surgery.

## 7 THE SURGERY

### **7.1 The Operating Theatre**

The operating theatre should meet the relevant accreditation standards, particularly in relation to infection control, instrument sterilisation, and the availability of oxygen and suction equipment. It should be air-conditioned and should have adequate secure, dust-free, air-conditioned storage space for equipment. The floor should be stable and firm, to minimise vibration and interference with a floor-mounted operating microscope.

Surgical equipment should be taken to metropolitan distributors or hospitals for maintenance as required. Alternatively, arrangements should be made for servicing and calibration at the regional or district hospital.

Delivery services may be infrequent or take days to complete, so surgical consumables should be held in sufficient quantity to meet any contingencies arising during surgery. Where surgical lists are infrequent, to avoid consumables passing their 'use-by date,' stock can be held on consignment and/or several surgical facilities can share and rotate the same stock (for example, anterior and posterior chamber intraocular lenses).

The operating microscope should be coaxial, with suitable illumination, magnification and working distance. It may be mounted on the floor or an operating table, although the former is preferred. Foot-controlled focus or XYZ alignment is preferable.

The phacoemulsification machine should be easy to assemble and easily tested by nursing staff infrequently involved in cataract surgery. Further, it should require few consumables and only minimal routine maintenance. It should also have the capability for anterior vitrectomy.

Given the high staff turnover in many rural and remote hospitals—with the resultant loss of institutional memory and the difficulties this creates for occasional surgical lists—it is wise to compile and keep up to date documents outlining the set-up, use, cleaning and storage of ophthalmic equipment and the ordering of ophthalmic supplies. This information is useful for both new staff and the surgeon.

### **7.2 Preparation for Surgery**

- s In general, no sedation is given for routine regional anaesthesia. In this situation, the patient's hand should be held by a theatre nurse,

a liaison officer, a community health worker or someone accompanying the patient; the patient should be reassured throughout the procedure.

- s Topical anaesthetic is applied. Intravenous access is recommended because of the potential risk for cardiorespiratory depression.<sup>19</sup> Topical phenylephrine 10% and tropicamide 1% (or cyclopentolate 1%) are generally available in rural and remote hospitals, without the need to organise a special order. They give satisfactory mydriasis when instilled 60, 30 and 15 minutes before the patient is called to the operating theatre.
- s If it is the surgeon's preference, a topical antibiotic can be instilled when the topical mydriatic is applied. Topical chloramphenicol is ubiquitous and cheap, but a topical antibiotic is less effective than topical aqueous betadine 5% for decontaminating the conjunctival sac.
- s The conjunctiva, eyelid margins, eyelids and adjacent face should be decontaminated with aqueous betadine 5%. Trimming of eyelashes is not required.
- s Regional anaesthetic, generally peribulbar, should be applied using the surgeon's preferred technique.
- s Monitoring by qualified personnel during surgery can include electrocardiogram, pulse oximetry, blood pressure and respiration.

### **7.3 The Surgery Itself**

The patient can walk into the operating room and be positioned comfortably on the operating table, with their arms and elbows supported by side boards, a pillow under their knees, a warm blanket over them, and a guard bar positioned so that the sterile drape later applied will not be resting on their face. An oxygen outlet with a pulse-oximeter attached should be secured to the guard bar and positioned near the patient's nose.

The patient should be told what is about to happen:

- s Their face will be washed again.
- s A plastic drape will be fitted over their face, but air will be coming through the tubing near their nose, so they will have no difficulty breathing.
- s They will be awake, but the eye will be 'asleep.'

- s They will hear noises and talking but should not worry about it.
- s It is important that they do not make any abrupt head movements during the surgery.
- s They may sneeze or cough, but only after telling the surgeon that this is about to happen, so that the instruments can be withdrawn from their eye.
- s They may, without moving their head, tell the surgeon if there is any problem.

Operating theatre staff should be reminded that the patient is awake, and unnecessary conversation and noise should be avoided. It is recommended that an Indigenous health worker be present in the theatre.

At the completion of surgery, a pad or a shield, or both, should be placed over the operated eye to protect it and keep it clean.

The patient should be informed of the likely outcome for their vision; the opportunity can also be used to reinforce the reason for surgery if the indication for intervention was not primarily visual rehabilitation. The Indigenous health worker can provide valuable support and reassurance at this time.

### 7.3.1 THE SURGICAL TECHNIQUE

Although the cataract-extraction technique to be used will depend on the surgeon's preference, phacoemulsification with in-the-bag intraocular lens implantation is the operation of choice. This technique is well suited to rural and remote circumstances for several reasons:

- s It tolerates poor post-operative medication compliance.
- s It tolerates poor follow-up.
- s It leads to a more robust eye, one that is better able to withstand untoward post-operative events (for example, trauma).
- s It may obviate the need for suture removal and allows for faster recovery of visual acuity.

Manual extracapsular cataract extraction with intraocular lens implantation is an appropriate technique in the following circumstances:

- s when there is a failure of the phacoemulsification machine;
- s when the nucleus is too hard for safe phacoemulsification;
- s when pseudoexfoliation of the lens is associated with sufficient phacodonesis to make phacoemulsification unsafe;

- s when traumatic phacodonesis is sufficient to make phacoemulsification unsafe.

Intracapsular cataract extraction is an inappropriate technique for routine cataract surgery but is useful in two particular situations:

- s when the lens is dislocated;
- s when there is marked phacodonesis with vitreous in the anterior chamber.

Surgery should not be performed in both eyes at the same time because of the potential for bilateral loss of vision. There may, however, be rare occasions when bilateral surgery should be performed, but these should be considered very carefully.

Before the operation, plans need to be made for the patient's evacuation if severe intra-operative complications occur—for example, a 'dropped nucleus.'

Given the high staff turnover in many rural and remote hospitals, it is wise to compile and keep up to date documents outlining the layout of instruments on the scrub trolley (including photographs showing the instruments' names and positions), the order of using instruments during cataract surgery, and the 'dos and don'ts of cataract surgery' (for example, correct flushing, cleaning and care of cannulas and how to avoid confusion of gentamicin with intraocular medications). This information is useful for both new staff and the surgeon.

### 7.3.2 INTRA-OPERATIVE COMPLICATIONS

Complications can arise in the intra-operative stage (including complications related to anaesthesia) and in the immediate and longer term post-operative stages. Sight-threatening complications from cataract surgery are uncommon, but blindness does occasionally occur. There are no data to suggest that Indigenous Australians have an altered risk, all other things being equal.

The following are among the potential intra-operative complications:

- s complications during the administration of local anaesthesia—for example, scleral perforation and retrobulbar haemorrhage; optic, oculomotor, trochlear or abducent nerve injury; and extraocular muscle injury (0.7 per cent)<sup>26</sup>;
- s capsular rupture and/or zonular fibre rupture with or without vitreous loss (0.8 per cent)<sup>11</sup>;
- s incomplete removal of fragments of the cataract<sup>11</sup>;

- s intraocular haemorrhage including expulsive choroidal haemorrhage (1.1 per cent)<sup>11</sup>;
- s iris trauma (1.3 per cent).<sup>11</sup>

The most common surgical complication encountered in rural and remote settings is capsule rupture with vitreous loss, such that it may be better to leave some residual cortex during cortical clean-up, rather than risk capsule rupture. Anterior vitrectomy instrumentation must be available.

Although the intraocular lens insertion technique to be used following vitreous loss and clean-up will depend on the surgeon's preference, implantation of an anterior chamber intraocular lens is more practical than a sutured posterior chamber lens. A peripheral iridectomy is recommended with AC intraocular lenses.

## 8 POST-OPERATIVE CARE

Provided this complies with the facility's protocol for patient transfer from the operating theatre, the patient should walk back to the waiting area near the operating suite and:

- s when necessary, have their blood sugar assessed and attended to;
- s have their vital signs monitored;
- s be given food and drink;
- s be encouraged to discuss with patients awaiting surgery the fact that the expectation was worse than the experience;
- s be given pain relief if necessary.

### **8.1 Criteria for Discharge**

Among the criteria for discharge after ambulatory surgery are the following:

- s stable vital signs;
- s return to pre-operative mental state;
- s absence of nausea;
- s absence of significant pain;
- s availability of an Indigenous health worker or some other support person, if necessary;
- s review of post-surgical care with the patient or support person, or both.

The attending nurse or health worker should explain the immediate post-operative requirements to the patient and the person accompanying them. These include the following:

- s reporting bleeding, pain, nausea or vomiting;
- s taking it easy and avoiding physical strain for the remainder of the day and evening;
- s taking any acetazolamide tablets or other oral medication given on discharge;
- s leaving the eye pad and shield intact until next seen by the surgeon;
- s appearing at the appointed time the following day for the first dressing.

An illustrated post-operative instruction leaflet may be of use in helping the patient to understand these requirements.

If the indication for surgery is not primarily visual rehabilitation, the immediate post-operative period should be used to reinforce this for the patient and any immediate family, other relatives, health workers, or other people accompanying the patient.

The patient should be transported to their accommodation, arrangements having been made for them to attend the first dressing the following day.

## **8.2 The First Dressing**

At the first dressing, there are a number of things the ophthalmologist should do:

- s before removing the pad and shield, discuss the probable level of immediate vision;
- s discuss the probable course of visual rehabilitation during the recuperative period;
- s discuss—with the patient, any immediate family, other relatives, health workers or other people accompanying the patient—the probable long-term visual outcome, particularly if the indication for surgery is not primarily visual rehabilitation;
- s make an assessment of the patient's unaided visual acuity;
- s check the condition of the cornea, the integrity of the wound, intraocular pressure, the level of anterior chamber activity and the position of the intraocular lens and look for evidence of infection;

- s discuss with the patient and their caregiver the symptoms and signs of possible complications, eye protection, suitable post-operation activities, the need for and use of medications, arrangements for follow-up visits, and how to get emergency care, especially if visual acuity deteriorates;
- s give the patient adhesive tape, a shield, and topical antibiotic and steroid medications.

Patients and their caregivers should also receive information about the following:

- s use of the protective shield at night for the first week;
- s storage, application and frequency of use of topical medications;
- s appropriate activities such as hair and face washing, reading, watching television, lifting, and bending;
- s inappropriate activities such as eye rubbing;
- s what to do if there is increasing ocular pain or decreasing visual acuity, or both;
- s how to contact the surgeon or his or her deputy should a complication arise;
- s the next follow-up appointment.

Where possible, the post-operative medication regime should be the same for all patients, and it should be easy to remember and execute—for example, three times a day for three weeks, then twice a day for two weeks.

Following the first dressing, the hospital liaison officer or regional eye health coordinator should organise the patient's return to their community and let the community's health workers know that the patient is about to return.

### **8.3 Clinic Records**

An operation summary (giving details of the date, the technique used, the power of the intraocular lens, and any complications that arose), a report of the first-dressing findings (detailing visual acuity and any complications) and a copy of the instructions for post-operative care should be faxed or sent to the patient's community clinic.

This information is for the use of the attending health workers, nurses and the primary care physician, who will generally supervise the patient during the convalescence period and be responsible for early

detection and referral of complications. The ophthalmologist will also need to see the records when he or she visits the community to provide follow-up care.

## 9 COMPLICATIONS FOLLOWING ROUTINE CATARACT SURGERY

Among the possible complications in the immediate post-operative period are:

- s corneal oedema (0.3 per cent)<sup>11</sup>;
- s raised intraocular pressure (1.4 per cent)<sup>11</sup>;
- s endophthalmitis (0.13 per cent).<sup>11</sup>

Among the possible longer-term post-operative complications are:

- s cystoid macular oedema (1.4 per cent)<sup>11</sup>;
- s persistently raised intraocular pressure or glaucoma (1.4 per cent)<sup>11</sup>;
- s retinal detachment, especially if vitreous loss has occurred (0.7 per cent)<sup>11</sup>;
- s decentred or dislocated intraocular lens (1.1 per cent)<sup>11</sup>;
- s posterior capsular thickening (19.7 per cent)<sup>11</sup>;
- s exacerbation of some types of pre-existing aged-related macular degeneration;
- s exacerbation of diabetic retinopathy;
- s unsatisfactory post-operative refractive status.

Despite these potential complications, cataract surgery is a highly effective procedure. The pooled results of pre-1992 literature show that post-operative visual acuity reached 6/12 or better in 90 per cent of all cases of cataract surgery and in 95 per cent of cases without pre-surgical ocular co-morbidity.<sup>11</sup> The Cataract PORT study showed an improvement in VF-14 in 89 per cent of patients, an improvement in satisfaction in 85 per cent of patients, and an improvement in self-reported difficulty with vision in 80 per cent of patients.<sup>18</sup> Nevertheless, patients and ophthalmologists must recognise that complications do occur from time to time and that cataract surgery cannot be considered a risk-free or minor procedure.

Operative complications of an ocular or medical nature are possible indications for unplanned post-operative hospitalisation. Possible ocular complications are hyphema, uncontrolled elevated intraocular pressure, threatened or actual expulsive suprachoroidal haemorrhage, retrobulbar haemorrhage, severe pain, and other problems requiring acute management or careful monitoring.

Possible medical complications are cardiac instability, respiratory instability, a cerebrovascular episode, diabetes mellitus requiring acute management, uncontrolled nausea or vomiting, acute urinary retention, acute psychiatric disorientation, and other medical conditions requiring acute management or careful monitoring.

Planned post-operative hospitalisation might be warranted in the following circumstances:

- s if the patient has medical conditions that call for prolonged post-operative observation by nurses or other skilled personnel;
- s if best correctable vision in the unoperated eye is 6/60 or worse;
- s if the patient is mentally debilitated or diagnosed as mentally ill;
- s if the patient cannot walk or cannot care for himself or herself, or if a responsible caregiver is unavailable, during the immediate post-operative period.

If a serious complication does occur during the convalescence period:

- s The ophthalmologist must make themselves available to advise the attending health worker, nurse or primary care physician.
- s The patient may be reviewed by the ophthalmologist, using telemedicine technology.
- s The patient may need to be transferred to the ophthalmologist's metropolitan base practice or hospital.

## 10 POST-OPERATIVE REVIEW

After the first dressing, the timing of the ophthalmologist's review of the patient will probably be determined by the ophthalmologist's schedule for visiting the community, which may not be until two or three months after the surgery.

This review will include an assessment of:

- s visual acuity
- s intraocular pressure
- s slitlamp examination of the anterior ocular segment; and
- s indirect ophthalmoscopy of the fundus.

Further, and as appropriate, the assessment will include referral for refraction and dispensing of spectacles and determine the progress and completion of post-operative rehabilitation.

During the convalescence period, ideally the patient will follow the advice and instructions of the ophthalmologist. In turn, the ophthalmologist's obligation to the patient is to provide post-operative eye care or, when necessary, make arrangements for referral of the patient to another ophthalmologist. This period continues until post-operative rehabilitation is complete.

At a minimum, following phacoemulsification and implant lens surgery, the patient should be reviewed within three days of surgery and undergo a final review about two to three weeks after surgery.

A dilated ophthalmic exam should be performed at least once during the post-operative period to visualise the intraocular lens for proper centration, to assess the status of the lens capsule, and to evaluate the peripheral retina for retinal traction, tears, detachment or posterior vitreous detachment.

The timing and frequency of refraction will depend on the patient's needs, the extent of astigmatism, and the stability of the measurement. The ophthalmologist can cut or remove sutures to reduce astigmatism. Usually, optical correction can be prescribed six to 12 weeks after standard extracapsular cataract extraction surgery and between one and four weeks after surgery by phacoemulsification or manual nucleus fragmentation.

## 11 POSTERIOR CAPSULE OPACIFICATION

The incidence of posterior capsule opacification depends on a number of factors, among them the type of surgery, the age of the patient, and the type of intraocular lens material. Reported incidence ranges from 3 to 58 per cent within three years of surgery.<sup>27</sup> A figure of 20 per cent is commonly quoted.<sup>25</sup> There are no data on the incidence of posterior capsule opacification among Indigenous Australians.

Diagnosis of the condition is based on reported reduced vision or problems with glare or reduced colour contrast. The presence of capsule opacification is confirmed by ophthalmoscopy or retinoscopy and slit-lamp biomicroscopy. Other causes of visual loss should also be considered.

Nd:YAG laser capsulotomy is the recognised technique for treating capsular opacification. Treatment should usually be delayed for at least three months following surgery, and the patient's informed consent should be obtained. Indications for the procedure are capsule opacification leading to either functional visual impairment or impaired visualisation of the retinal fundus for the evaluation or treatment of retinal disease.

Among the complications associated with Nd:YAG laser capsulotomy are:

- s transient elevation of intraocular pressure;
- s retinal detachment;
- s cystoid macular oedema;
- s hyphema;
- s intraocular lens subluxation or dislocation;
- s direct intraocular lens damage, with visible pitting;
- s vitreous prolapse.

The frequency of follow-up visits after such a procedure varies, depending on the patient's condition and pre-existing co-morbidities. The intraocular pressure of patients with compromised optic nerve status should be monitored. A dilated ophthalmic exam should be performed within one year to visualise the capsule and to check for possible retinal detachment. Patients with risk factors for retinal detachment—for example, young high myopes and patients with longer axial length, pre-existing lattice degeneration or a history of retinal detachment in either eye—should be examined within one month of surgery. Most importantly, patients should be educated about the symptoms of posterior vitreous detachment and retinal tears and detachment and the need for immediate examination if these symptoms are noticed.

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**Part 3**

**Trachoma**

## 1 INTRODUCTION

Australia is one of 46 countries<sup>1</sup> that still has hyper-endemic blinding trachoma. Trachoma ceased to be a problem in the mainstream Australian community about 100 years ago, but it still affects many remote Indigenous communities.

These guidelines for the treatment of trachoma in Aboriginal and Torres Strait Islander communities draw upon the Taylor recommendations<sup>2</sup>, the World Health Organization guidelines, *Vision 2020* (a global initiative for the elimination of avoidable blindness by the year 2020)<sup>3</sup>, and the available evidence relating to Indigenous Australians. The guidelines identify key factors specific to the treatment and management of trachoma in Aboriginal and Torres Strait Islander communities and provide clinical information for eye health specialists and other health professionals responsible for managing the eye health of Aboriginal and Torres Strait Islander people.

The guidelines cover the epidemiology of trachoma; screening, management and control; health promotion; and the role of Indigenous health workers in trachoma prevention and management.

## 2 BACKGROUND

### 2.1 Definition

Trachoma is a chronic conjunctivitis caused by repeated episodes of infection with the obligatory intracellular organism *Chlamydia trachomatis*.<sup>3</sup> First evident in childhood, it is an acute inflammatory condition characterised by recurrent infection and scarring of the tissues of the eyelid, which eventually causes trichiasis—an in-turning of the lid margin and the eyelashes. Rubbing of the in-turned eyelashes on the cornea leads to corneal damage, opacification and blindness.

### 2.2 The Patient Population

Aboriginal and Torres Strait Islander people, especially those living in rural and remote parts of Australia, form the patient population.

Blindness from trachoma is predominantly found in older people. Active trachoma is more likely with recurrent infection and is usually seen in children.

### **2.3 The Purpose of Control and Treatment Programs**

Trachoma and the resulting blindness impose a significant burden, both economic and social, on the communities in which the disease is prevalent. It results in impaired quality of life<sup>3</sup>, the risk of infecting others, the personal discomfort and pain of repeated eye infections and high economic costs.

In terms of cost-effectiveness, non-surgical and surgical interventions for trachoma control share with cataract surgery the distinction of being among the most successful of all medical prevention activities.<sup>4,5</sup>

The primary purpose, therefore, of implementing strategies for controlling and managing trachoma is to prevent recurring infections that can lead in the long term to blindness, to treat blinding conditions and so limit and avoid visual impairment, and ultimately to eliminate trachoma in communities where it is currently endemic.

### **2.4 The Affected Community**

The World Health Organization identified the need for and type of treatment programs based on prevalence rates of active trachoma in children aged up to 10 years in a community.<sup>6</sup>

- s Where the prevalence rate in a community is 20 per cent or higher, trachoma is said to be hyper-endemic.
- s Where the prevalence rate in a community is 5 per cent and up to 20 per cent, trachoma is said to be endemic.
- s Where the prevalence rate in a community is less than 5 per cent, trachoma is said to be non-endemic.

Using this classification, trachoma is, as noted, hyper-endemic in some parts of Australia.

However, the WHO prevalence rates were set for treatment regimes based on the application of topical tetracycline ointments. The ability to treat trachoma with a single oral dose of azithromycin antibiotic now means that this breakdown may need reconsideration and is most probably not appropriate in Australia.

### **2.5 The Goals**

The aim of these guidelines is to provide 'best practice' standards for eye care specialists, hospital and community workers, health workers, and other health professionals, so that they can respond effectively to the presence of trachoma in Aboriginal and Torres Strait Islander communities.

There are thus three goals:

- s to identify the communities in which trachoma is present;
- s to enable the adoption of a consistent approach to the assessment and treatment of trachoma in those communities;
- s to provide a framework for the implementation of 'best practice' in the management and treatment of trachoma.

### 3 EPIDEMIOLOGY

#### **3.1 Trachoma**

Recent data on the prevalence of trachoma have often been based only on the examination of older children. Pre-school age children are more susceptible to trachoma, however, and are the most important age group to examine. Further, studies tend to report only on the presence of follicular or inflammatory trachoma (the first of the WHO grading signs—see Section 4.2) and not to assess the presence of the sequelae of trachoma: scarring and trichiasis. This makes it difficult to accurately determine the current prevalence of trachoma.

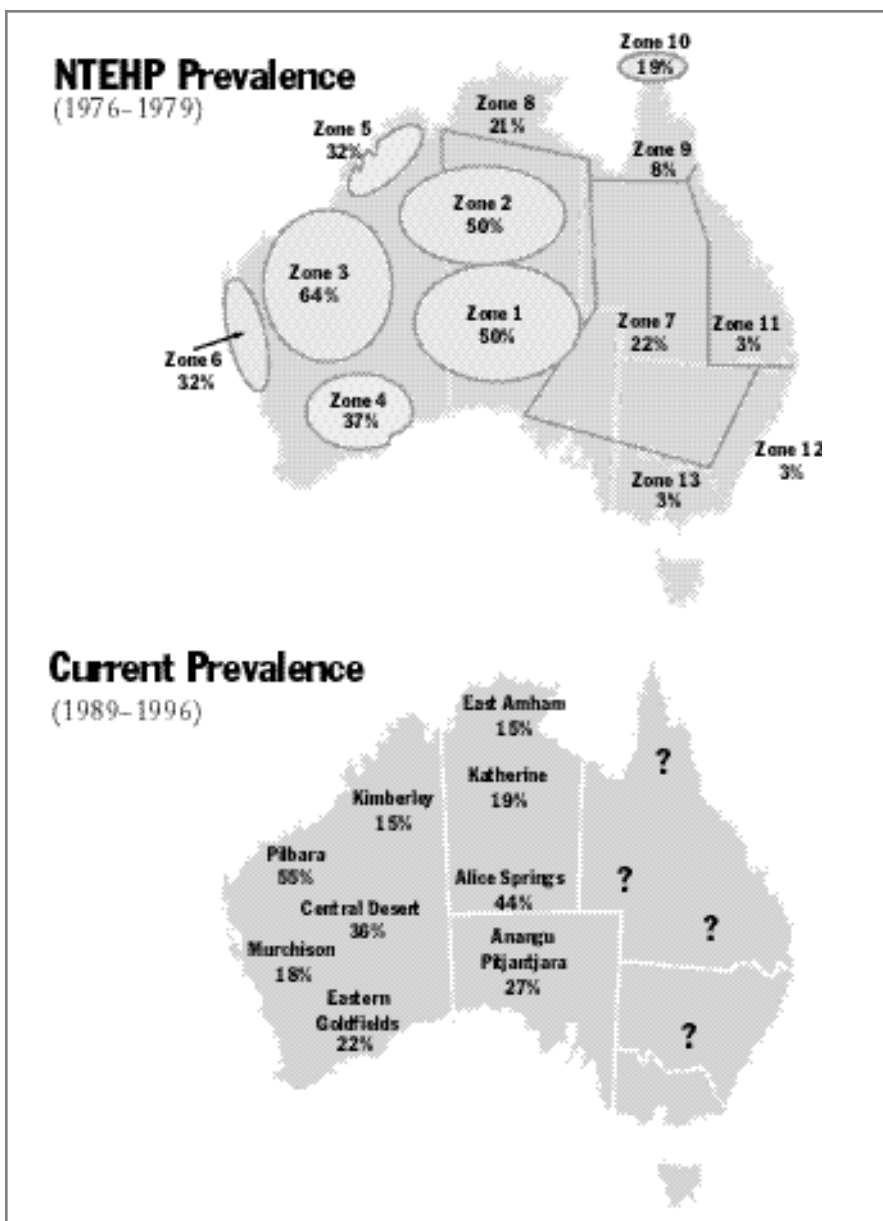
Nevertheless, there is evidence that trachoma remains a significant cause of blindness in Aboriginal people—blindness due to corneal opacity as a consequence of trichiasis. Anecdotal evidence and small surveys show that trichiasis still affects a significant proportion of the elderly Aboriginal population.<sup>3</sup> No data are available for Torres Strait Islander people specifically.

Trachoma is known to be prevalent in rural and remote areas in Western Australia, South Australia and the Northern Territory. Its incidence in Queensland and New South Wales is currently unknown, although it was endemic in Aboriginal populations in both these States in the 1970s and the 1980s.<sup>7</sup>

The current prevalence of trachoma varies between communities in the affected areas. It has been reported as ranging from 12 to 60 per cent among children in communities from East Arnhem Land in the Northern Territory and the Pilbara in Western Australia. An ongoing study in Anangu Pitjantjatjara lands in South Australia has found a prevalence of approximately 40 per cent in children aged 0 to 10 years.<sup>8</sup> Similar findings were also made in a recent study undertaken in a Central Australian Aboriginal community.<sup>9</sup>

Trachoma is hyper-endemic (according to the WHO definition) in many Aboriginal communities. Further, information gathered during the 1997 review<sup>2</sup> suggests that in some communities there has been little improvement since the National Trachoma and Eye Health Program survey conducted between 1976 and 1978 (see Figure 1).

Figure 1. The prevalence of follicular trachoma among Aboriginal children, 1976 to 1978 and 1989 to 1996



In many remote areas of Australia trichiasis and its complications are still a serious problem in elderly Aboriginal people, although data defining the extent of the problem are limited.<sup>3</sup> The National Trachoma and Eye Health Program study found trichiasis in 11.8 per cent of the Aboriginal population aged over 60 years.<sup>7</sup> Some occurrences were also found in younger age groups, but the development of trichiasis is strongly age-related and found most often in middle to late age groups. A 1990 survey in the Anangu Pitjantjatjara lands<sup>10</sup> found 36 cases, and a 1993 survey of 308 people in the Fitzroy Crossing region<sup>11</sup> found four people with trichiasis but scarring in 154 people. Such findings are supported by anecdotal evidence. The 1997 report<sup>3</sup> concluded that there is no reason to suspect the fundamental biology of trachoma has changed in the last 20 years.

### **3.2 Risk Factors**

The prevalence of trachoma is influenced by the availability of infrastructure and basic services such as clean water, garbage disposal and appropriate housing.<sup>12</sup> Among the main risk factors are:

- s the physical environment—the presence of dirt, dust and flies, overcrowded living arrangements, sharing sleeping materials and bedding, and animals in close proximity<sup>15,13,14</sup>;
- s limited water supply, restricted access to water and associated poor hygiene practices<sup>15</sup>;
- s inadequate sewage- and garbage-disposal facilities.<sup>16,2</sup>

There is also a need to improve facial cleanliness among children<sup>17,18,19</sup>: lack of cleanliness contributes to the exchange of infection.

### **3.3 Extraocular Infection**

In areas where trachoma is endemic, it has been shown that children with active ocular chlamydial infection also have extraocular chlamydial infection<sup>20</sup>, with chlamydia being isolated or identified in otitis media and in respiratory and gastrointestinal tracts as well as the genital tract. Re-infection from extraocular sources of infection might therefore play a role in transmission of the infection. However, other studies have not confirmed this. The use of a systemic antibiotic did not lower the reinfection rates at follow-up<sup>21</sup>, nor was the incidence rate of new infections found to differ between children who had a positive nasal specimen at baseline and children who had a negative one.<sup>22</sup>

### 3.4 The Natural History of Trachoma

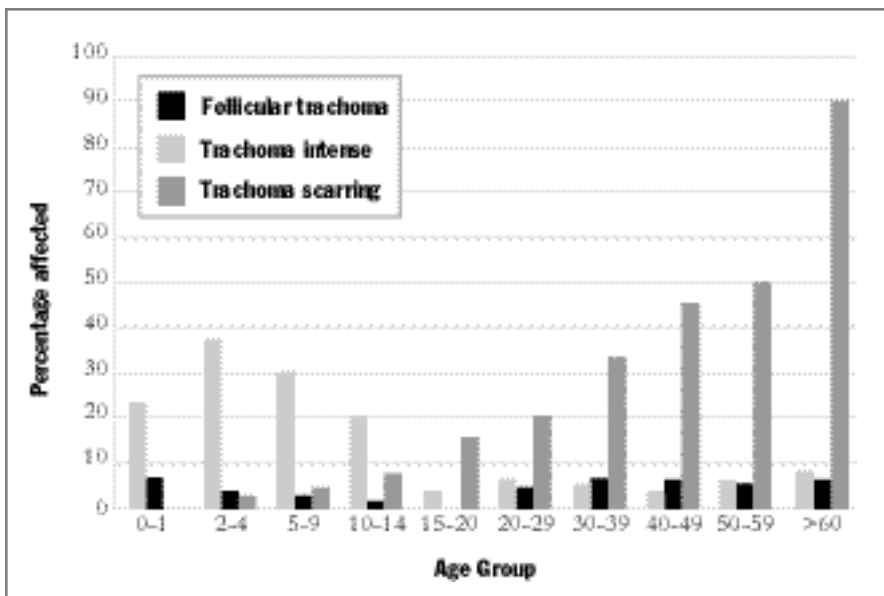
Trachoma can be regarded as having two phases:

- s Inflammatory, or active, follicular trachoma is most often seen in young children, particularly those under the age of 5 years (see Figure 2). The severity of active trachoma in childhood determines the risk of developing blinding complications in later life.
- s The scarring sequelae are usually found in adults, with development of trichiasis, corneal opacification and blindness.

In some countries adult women have been found to be at greater risk of developing the blinding complications of trachoma than are men.<sup>20</sup> This has, however, not been demonstrated in Aboriginal communities, where the blinding sequelae of trachoma occur as frequently in men as in women.<sup>7,23</sup>

Trachoma transmission occurs predominantly within the family or household. The risk of becoming infected is related to the likelihood of contact with an infected individual; families with infected preschool age children, who form the reservoir of infection, are more susceptible. Children living in families where their siblings have trachoma are at increased risk, as are women acting as primary care givers.<sup>24</sup>

Figure 2. Follicular trachoma, trachoma intense and trachoma scarring by age group<sup>11</sup>



## 4 SCREENING FOR TRACHOMA

### **4.1 Initial Surveys**

Initial surveys can be conducted to assess the prevalence of trachoma in identified communities and to determine which communities require primary interventions. Epidemiological surveys are a useful way of collecting information not available from routine health information or existing surveillance systems.<sup>25</sup>

#### 4.1.1 WHO SHOULD BE SCREENED?

The World Health Organization recommends that children aged 0 to 10 years be screened. Current practice in Australia varies from State to State: some States screen only school-age children (5 to 15 years)<sup>26</sup>. The main reasons for this type of screening are logistics and convenience, but screening only school-age children can lead to a significant underestimation of prevalence.

These guidelines recommend that children aged 2 to 7 years be screened, to give an accurate indication of prevalence in a particular community.

Rapid-assessment screening can be done by a doctor, a nurse or other health care worker.<sup>7</sup> A reporting form can be specially devised or the form recommended by the World Health Organization can be adapted and used (see Appendix A).

#### 4.1.2 THE WHO GUIDELINES ON RAPID ASSESSMENT

The World Health Organization has prepared draft guidelines<sup>27</sup> for conducting a rapid assessment. The following steps—which have been modified slightly for use in Aboriginal and Torres Strait Islander communities—are recommended:

1. Review existing community-based data on trachoma, other eye diseases and eye surgery.
2. Interview health care workers, community workers and other health professionals to identify communities likely to have trachoma.
3. In selected communities—that is, those where trachoma is likely to be present—carry out direct observations to
  - identify and contact as many people as possible, if not all, with trichiasis living in the community,
  - assess whether active trachoma is present in the community.

4. Meet with community leaders to brief them on the assessment process. A larger public meeting to explain the purpose of the assessment and to collect observational data should follow this initial meeting.
  - The public meeting should be used to identify as many people with trichiasis as possible through showing a picture and asking a series of questions designed to uncover who the community thinks is likely to have trichiasis.
  - Each of the cases identified through this meeting should be contacted and examined. Trichiasis should be confirmed using the WHO grading system (see Section 4.2).<sup>7</sup>
  - A list of patients for surgery should be prepared and arrangements made for the procedure to be performed at the nearest hospital or clinic. If a regional model for the delivery of eye care is in operation, arrangements for trichiasis surgery should be integrated within that model.<sup>3</sup>

The number of people with trichiasis gives an indication of the priority for providing surgical services for lid correction.

Two further steps should then be taken:

5. Fifty children (2 to 7 years old) from a minimum of 15 families or households should be selected for examination.
6. The active trachoma pattern should be assessed by a standardised examination of the everted eyelid, in accordance with the WHO simplified grading system (see Section 4.2.1).

#### **4.2 Clinical Features**

Trachomatous inflammation of the inside lining of the eyelids—the conjunctiva—starts with the appearance of follicles, which are yellow or white ‘spots’ in the tarsal conjunctiva and are lymphoid germinal centres. The conjunctiva is red and swollen, and small red dots (papillae) may be visible. Severe inflammatory trachoma presents as thickening of the conjunctiva, with inflammation obscuring the deep tarsal vessels.

Although corneal changes may occur during active inflammation, they are not a sensitive indicator of trachoma. Limbal follicles may appear, and new vessels develop, producing corneal pannus. Once the limbal follicles resolve, depressions remain in the periphery of the cornea, resulting in a pathogenic sign of trachoma—‘Herbert’s Pits.’

Multiple infections, or prolonged and severe infection, are followed by evidence of scarring of the conjunctiva. Severe scarring results in trichiasis, or in-turned eyelashes.

Trichiasis causes damage to the cornea, resulting in scarring, seen as a corneal opacity. Trichiasis and entropion (where the eyelid is rolled inward against the eyeball) eventually require lid surgery to stop the eyelashes rubbing on the globe and to prevent visual loss from corneal opacification. If trichiasis is not corrected, the cornea will develop irreversible opacities.<sup>28</sup>

#### 4.2.1 THE WHO SIMPLIFIED TRACHOMA-GRADING SYSTEM

The World Health Organization has developed a simplified classification scheme for assessing community endemicity; it should be used in determining the presence and severity of trachoma.<sup>29</sup> The scheme is based on five clinical signs of trachoma—see Table 1.

The WHO simplified trachoma-grading system<sup>7</sup> is now universally recommended for use in field surveys of trachoma. It is designed for using a binocular loupe with x2 or x2.5 magnification. A good torch is essential if the examination is done indoors; otherwise, the examination can be done in direct sunlight. Each eye should be examined separately, starting with the right eye.

The eye is examined first for trichiasis—either one or more in-turned eyelashes actually rubbing on the eye or previously removed eyelashes. To check for the former, it is important to expose the lid margins. The cornea is examined for opacities, and finally the inside of the upper lid, the tarsal conjunctiva, is examined for follicles, intense inflammation and scarring.

Table 1. The WHO simplified trachoma-grading system<sup>7</sup>

Sign	Description	Significance
<b>Trachomatous inflammation—follicular (TF)</b>	<b>The presence of five or more follicles of at least 0.5 mm in diameter in the upper tarsal conjunctiva. (Follicles are whitish round spots paler than the surrounding conjunctiva.)</b>	<b>Current active infection requiring antibiotic treatment.</b>
<b>Trachomatous inflammation—intense (TI)</b>	<b>Pronounced inflammatory thickening of the tarsal conjunctiva that obscures 50% or more of the normal deep tarsal vessels. The tarsal conjunctiva often appears red, roughened and thickened. Inflammatory thickening of the conjunctiva should not be confused with that caused by scarring.</b>	<b>Severe current infection with an increased risk of scarring and also requiring antibiotic treatment.</b>
<b>Trachomatous scarring (TS) and will require</b>	<b>The presence of scarring in the tarsal conjunctiva. This should be easily visible as white lines or bands on the tarsal conjunctiva—glistening and fibrous in appearance. Scarring may also obscure the tarsal blood vessels, and it should not be confused with diffuse inflammatory thickening.</b>	<b>The patient has or has had clinical practice guidelines regular review to identify and deal with possible progression to trichiasis.</b>
<b>Trachomatous trichiasis (TT)</b>	<b>At least one eyelash rubs on the eyeball. Evidence of recent removal of in-turned eyelashes should also be graded as trichiasis.</b>	<b>The patient might develop corneal opacity and visual loss and require surgery to correct the condition as soon as possible.</b>
<b>Corneal opacity (CO)</b>	<b>Easily visible corneal opacity over the pupil. This means central corneal scarring so dense that at least part of the pupil margin is blurred when viewed through the opacity.</b>	<b>This is a disabling lesion. The patient will require rehabilitation and support and should be referred to an ophthalmologist for consideration of possible surgical correction.</b>

### **4.3 Chlamydial Infection and Clinically Active Trachoma: Laboratory Testing**

Although chlamydia infection is the cause of trachoma, it cannot always be detected in the presence of the clinical disease. These guidelines therefore recommend that intervention strategies be based on the clinical findings of the presence of active trachoma in the community or family, as determined using the WHO simplified grading system, and not on the basis of laboratory confirmation.

Laboratory diagnosis of chlamydia infection is made through detection of the organisms in ocular specimens where the infection is suspected on clinical grounds or for research interests. Diagnosis can be made using various methods, including cytological examination of stained slides of conjunctival swabs, by growing the organism in tissue-culture cells, and by detection of antigen or nucleic acids. (Note that the National Health and Medical Research Council's *Guidelines on Ethical Matters in Aboriginal and Torres Strait Islander Health Research* are available to guide researchers; among other things, they deal with consultation, community involvement, and ownership and publication of data.)

Direct fluorescent antibody cytology is an effective technique for detecting chronic chlamydial conjunctivitis. It offers an alternative to the tissue-culture isolation method. Data suggest that direct fluorescent antibody tests may be capable of detecting lower levels of chlamydial infection in the eye than chlamydial culture.<sup>30</sup>

A newer test for *Chlamydia trachomatis* is the polymerase chain reaction assay and a variant called ligase chain reaction (LCR). These DNA-amplification tests can be performed on material obtained from swabs from patients with suspected trachoma. Studies show mixed results in relation to the benefits of PCR testing. When compared with the WHO grading system, PCR testing has been found to have good sensitivity and to be very specific<sup>31</sup>, but it has a low negative predictive value and can be costly. Many cases with clear clinical disease are negative to PCR testing. The lag time between clearance of infection and resolution of clinical signs would account for some of these discrepancies. Although PCR testing is more sensitive than other laboratory tests<sup>32</sup>, it should not be used routinely as the basis for classifying communities: trachoma is a clinical diagnosis.

A recent study conducted in Nepal—in an area that previously had blinding endemic trachoma and still has a 6 per cent prevalence of clinically active conjunctival disease—failed to isolate any chlamydia agent, even using (LCR) testing.<sup>33</sup>

## 5 MANAGEMENT AND CONTROL OF TRACHOMA

### 5.1 An Integrated Primary Health Approach

A comprehensive community-based primary health care system is a prerequisite for sustainable implementation of trachoma programs. The aim of programs designed to manage and control trachoma is not only to treat active trachoma where it is found but also to reduce and ultimately eliminate the risk factors associated with the condition.<sup>34</sup>

An integrated primary health approach to the management and control of trachoma involves a combination of screening activity, antibiotic and surgical treatment, and environmental improvements to promote personal and community hygiene.

Only with environmental and hygiene changes will the long-term control and sustained elimination of trachoma be achieved.<sup>35</sup> Where trachoma is endemic, antibiotic treatment will be necessary to provide short-term relief and to reduce the reservoir of *Chlamydia trachomatis* in the community; at the same time, hygiene and environmental initiatives should be introduced.<sup>13</sup>

#### 5.1.1 THE WORLD HEALTH ORGANIZATION'S SAFE STRATEGY

The World Health Organization recommends an integrated and comprehensive approach to the prevention and treatment of trachoma—the SAFE Strategy—which should be implemented in the context of a planned national primary health care system.<sup>36</sup> The SAFE Strategy has four components designed to produce a combined medical, behavioural and environmental approach. It requires the active participation and involvement of communities. The four components are:

**S**urgery to correct trachomatous trichiasis;

**A**ntibiotics to reduce the reservoir of chlamydial infection within the community;

**F**acial cleanliness, especially in children;

**E**nvironmental changes to reduce the transmission of trachoma.

Although these components are listed in this way for the sake of an easy acronym, they are actually listed in ascending order of priority: environmental changes are the single most important component.

## **5.2 Surgery for Trichiasis**

In rural and remote areas where there is or has been trachoma, all people aged 40 years or more should have an eye examination for trichiasis as part of their routine health check. Lid surgery can correct the trichiasis that leads to corneal scarring.<sup>37</sup>

### 5.2.1 EPILATION

Epilation is not recommended as a treatment for trichiasis because of the potential for damage to the eye from regrowth of in-turned lashes and because broken lashes can be more harmful than unbroken lashes. Epilation can, however, give temporary relief before surgery. It should be done carefully, under supervision and using loupes.<sup>9</sup>

### 5.2.2 BILAMELLAR TARSAL ROTATION SURGERY

There are two indicators for bilamellar tarsal rotation surgery:

- s if one or more eyelashes are in-turned and touching the cornea when the patient is looking straight ahead; or
- s if there is evidence of recent removal of inturned lashes or corneal damage from trichiasis.

A prospective randomised controlled clinical trial performed in Oman showed that bilamellar tarsal rotation surgery was more effective than other forms of surgery for upper lid trichiasis due to trachoma.<sup>38,39</sup> Such simple surgery is, however, not recommended if there is defective lid closure.

Trichiasis surgery is quick, requires minimal equipment and can be performed under local anaesthetic. In other countries, trained paramedical eye health workers have successfully performed the procedure in the community setting.<sup>40</sup> This is the only procedure that has been fully evaluated in randomised clinical trials<sup>41</sup> and has proven efficacy.<sup>42</sup> In Australia, trichiasis surgery can be performed in the community if there are appropriate clinic facilities such as a treatment room suitable for suturing; otherwise it can be done in a regional hospital.

Surgical management of the condition involves rotating the marginal part of the eyelid outwards away from the globe, so that the lashes are no longer in contact with the eye. A horizontal split is made approximately 3 millimetres from the lid margin (through the tarsal conjunctiva and tarsal plate and as well through the orbicularis oculi muscle and

skin). This is followed by the outward rotation of the distal fragment, which is effected by everting mattress sutures.<sup>43</sup>

As noted, tarsal rotation surgery is not recommended where there is defective lid closure as a result of lid shortening. These cases require more extensive lid reconstruction, which may necessitate expertise in ocular plastic surgery.

Appendix B provides a full description of the bilamellar tarsal rotation technique recommended by the World Health Organization.

### 5.2.3 LONG-TERM FOLLOW UP

As the disease process continues, trichiasis may recur a year or more later, even in an eye that has undergone successful surgery. Further surgery may be needed. For this reason, patients who have had trichiasis surgery should be followed up annually.

## 5.3 Antibiotics

The antibiotic component of the World Health Organization's SAFE Strategy is designed to reduce the transmission of ocular chlamydia infection and reduce the prevalence and severity of active trachoma.

In general, the family should be regarded as the transmission unit for trachoma, and treatment should be directed at that unit.<sup>3</sup> At high levels of endemicity, however, where many families in a community have trachoma, the community should be regarded as the transmission unit.

### 5.3.1 TETRACYCLINE OINTMENT

Until recently, the treatment recommended by the World Health Organization was an application of tetracycline ointment 1% twice a day for six weeks. Intermittent treatment schemes of ointment application—twice a day for five consecutive days a month for at least six consecutive months or once a day for 10 consecutive days a month for six months—were also acceptable.<sup>44</sup>

There are, however, difficulties associated with topical tetracycline treatment that lead to poor patient compliance:

- s Ointment is difficult to apply, particularly to young children and infants.
- s Discomfort and blurring are associated with the use of ointment.
- s The infection can be symptomless and as a consequence there can be a lack of motivation to continue with a course of treatment.

The presence of extraocular chlamydial infection can lead to re-infection.

### 5.3.2 AZITHROMYCIN

An alternative to the use of topical tetracycline ointment is azithromycin, which overcomes most of the difficulties associated with the ointment. Azithromycin is an erythromycin-like macrolide antibiotic and requires only a single oral dose to maintain adequate tissue levels for up to eight days. Where this drug is available, the World Health Organization recommends its use in both individual and community programs for the treatment of trachoma.<sup>35</sup>

In Australia, use of azithromycin is the preferred mode of treating trachoma.<sup>3</sup> Through special arrangements under the Pharmaceutical Benefits Scheme, it is now available free of charge to patients obtaining health care from Aboriginal community-controlled health services in rural and remote areas. As a result, cost considerations—which in other countries act as a barrier to the widespread adoption of azithromycin as the drug of choice—do not apply.<sup>45</sup>

A single dose of azithromycin is as effective as a six-week course of topical tetracycline in clearing ocular chlamydial infection and resolving signs of active trachoma. Studies undertaken in the Gambia<sup>24</sup> and randomised clinical trials in Saudi Arabia<sup>46</sup> and northern Egypt<sup>47</sup> have demonstrated this.

A community-based randomised trial conducted in Egypt, the Gambia and Tanzania assessed the long-term effect of mass treatment with azithromycin compared with tetracycline.<sup>48</sup> One year after treatment, both clinical disease and laboratory evidence of infection in the community were reduced in each treatment group. There was, however, a significant and more sustained reduction in chlamydial infection with azithromycin treatment compared with topical tetracycline.

If only active cases are treated with azithromycin, and the other components of the SAFE Strategy are not used, active trachoma will recur. This confirms the need for an integrated approach: antibiotic treatment alone is insufficient to entirely eliminate active trachoma.<sup>41</sup>

Just what is the optimal interval for the re-treatment of trachoma in endemic communities and what are the appropriate target groups are somewhat uncertain.<sup>42</sup> Lietman et al.<sup>49</sup> used newly available data to model mathematically the effect of azithromycin treatment and the optimal frequency of re-treatment for reducing or eliminating trachoma. The model shows that when only children are treated and no other interventions are implemented, annual treatment is adequate in areas with an intermediate prevalence (35 percent or higher in children). In hyper-endemic areas (50 percent or higher prevalence in children), in the absence of other interventions, six-monthly treatment would be preferable.

In spite of this, these guidelines recommend that all family members be treated and that the SAFE Strategy be implemented in its entirety.<sup>33</sup>

### 5.3.3 THE BENEFITS OF AZITHROMYCIN

Azithromycin offers several important benefits:

- s Given as a single oral dose, it removes the possibility of incomplete treatment.
- s It is absorbed within a few hours.
- s It is very safe and has few side-effects—the most common side-effects are gastrointestinal symptoms, which are usually mild to moderate and disappear relatively quickly.<sup>35</sup> The Australian Drug Evaluation Committee has reported that azithromycin can be used by pregnant and lactating women.<sup>50</sup>
- s It assists with the control of most respiratory, skin and genital infections.

### 5.3.4 THE AUSTRALIAN EXPERIENCE

In Australia, azithromycin has been shown to be effective in reducing the rate of active trachoma in a number of Aboriginal communities. In the Katherine region of the Northern Territory, a trachoma treatment program was implemented using azithromycin in conjunction with health promotion initiatives.<sup>33</sup> The treatment protocol was based on the WHO guidelines, but only children were treated, not adults. The results demonstrated a fall in prevalence from 49 per cent in 1995 to 19 per cent in 1996 post-treatment. Azithromycin programs have been introduced in other communities with positive results<sup>51</sup>: in the Pilbara region of Western Australia, a 95 per cent resolution of active trachoma was found in children examined six to eight weeks after azithromycin treatment.<sup>3</sup>

### 5.3.5 BACTERIAL RESISTANCE

The possibility of bacterial resistance developing with widespread use of azithromycin is considered slight, given the drug's unusual pharmacokinetics.<sup>52</sup> But this question is not settled. An Australian study of the effect of azithromycin treatment on trachoma also monitored the drug's effect on the carriage and antimicrobial resistance profiles of pneumococci<sup>53</sup>: it showed that azithromycin allowed the growth and transmission of pre-existing azithromycin-resistant strains. However, other data lead to the conclusion that the prevalence of azithromycin-resistant pneumococci remains low.<sup>54</sup> Continuing surveillance is important.

### 5.3.6 FAMILY-BASED TREATMENT

The family or living unit has been recommended as the target for treatment in Australia.<sup>3</sup> Family-based treatment of trachoma means that all families or households with one child or more with trachoma need to be identified and all members of the household treated.

Compared with community-based treatment, family-based treatment reduces the number of people to be treated and thus minimises the risk of bacterial resistance. Even in hyper-endemic areas, there will be some families without trachoma. Family-based treatment is more cost- and resource-effective.

In communities that are known to have a high prevalence of infection—that is, areas of hyper-endemicity, or where the prevalence rate is greater than 20 per cent—it may be simpler to treat the entire community and obviate the need to examine members of all families. However, in areas where prevalence is lower or where prevalence rates have fallen, it will be necessary to specifically identify those households that have children with active trachoma. This means that all children in a family need to be examined to ensure that no child in that family has trachoma.<sup>44</sup>

#### *Action for family-based treatment*

- s Treatment should be given to all family members or all members of households in which there are children with active trachoma. In hyper-endemic areas this effectively means that most families in a community will be treated. For the purposes of treatment, ‘the family’ consists of those people (related or not) who live together or share a sleeping area.
- s The treatment course involves a single oral dose of azithromycin taken under supervision:
  - Children: 20 milligrams per kilogram, up to a maximum of 1000 milligrams;
  - Adults: 1 gram.
- s Families that still have children with active trachoma should be re-treated annually, until active trachoma disappears.

## 5.4 Facial Cleanliness

Facial cleanliness protects against trachoma.<sup>14</sup> As a result, interventions that encourage facial cleanliness—and not just facial washing—especially among pre-school and school children, are very important.

### 5.4.1 INTERVENTIONS FOR FACIAL CLEANLINESS

Various studies support the WHO emphasis on facial cleanliness and the need to implement combined trachoma-control interventions that include behavioural change strategies and take into account the availability of water.

In Tanzania, children from villages using the face cleaning and tetracycline intervention had reduced levels of trachoma when compared with children from villages who received only antibiotic treatment.<sup>55</sup> Children with a sustainably clean face also had a lower risk of constant severe trachoma.<sup>56</sup>

An improvement in personal and community hygiene requires improved access to water and health and public education efforts in conjunction with environmental improvements.<sup>40</sup>

### 5.4.2 PROMOTING FACIAL CLEANLINESS

- s Support Indigenous health workers in their efforts to promote personal hygiene (including face washing) through as many channels as possible—directly with mothers and caregivers and through women’s groups, families, school health workers, community groups, and so on.
- s Take the opportunity to promote hand washing before eating and after using the toilet and nose blowing. This may help to reduce the transmission of trachoma and will help to prevent ear and diarrhoeal diseases and upper respiratory tract infections.<sup>57</sup>
- s Follow neighbourhood meetings with school plays, posters, colouring books for children, workshops, or meetings with tribal leaders and traditional healers and arrange for individual health workers to meet with families and household groups to explain, promote and gather support for changed behaviour.<sup>52</sup>

- s Use the health promotion aids that are available to assist with education and promotion. Appendix C provides a list of currently available health promotion materials and where they can be obtained.
- s Develop health promotion aids that suit the circumstances of the particular community in which the intervention is occurring and that are sensitive to the local situation. This could include local television or radio programs or obtaining the cooperation of a sporting or local 'hero' to spread health promotion messages.
- s School-based health interventions—such as the BBC program *Breathing, Blowing, Coughing in the Northern Territory*—may be useful for promoting facial cleanliness in some communities.

### 5.5 Environmental Improvements

Improvements in living conditions will lower trachoma prevalence rates. Trachoma will be eliminated successfully in the long term only if appropriately targeted, community-based interventions are implemented.<sup>58</sup>

A recent review of the evidence for associations between environmental sanitation and transmission of trachoma identified the presence of flies, the availability and use of water, the presence of latrines, garbage collection and disposal, and animal hygiene as important factors associated with trachoma.<sup>2</sup>

The type of water supply, the distance to the water source, crowding, and trachoma endemicity in the community also influence the distribution of trachoma.<sup>15</sup>

A 1987 environmental health review<sup>59</sup> in Australia, *Uwankar Palyanyku Kanyintjaku*, described and quantified a physical environment that prevented the adoption of healthy living choices among the Aboriginal people on the Anangu Pitjantjatjara freehold lands of South Australia. The review developed a list of nine healthy living practices—ranging from the provision of water to dust control—that were needed to improve the health status of the people concerned. It also emphasised the importance of providing functional and suitable housing.

Projects implemented following the review demonstrated that improvements in essential health hardware provided in remote communities encourage the adoption of positive health practices and lead to specific improvements in health status.<sup>60</sup>

### 5.5.1 WATER

There is a close association between access to water and the prevalence of trachoma. A reduction in the risk of trachoma is consistently associated with better access to water.<sup>18</sup> However, the patterns of water consumption and water use are also of great importance.<sup>61</sup>

The frequency of trachoma increases with a household's increasing distance from water. The effect of the household's distance from the water source is independent of the amount of water brought into the family on a daily basis.<sup>62</sup> Households situated more than 30 minutes from the source of their water are at increased risk of trachoma. There is a plateauing effect with respect to consumption when water is within 30 minutes' distance from the home<sup>55</sup>, unless the pump or tap is in the home or yard.<sup>63</sup>

The relationship between water supplies and trachoma is complex, however, and the availability of water or easier access to it does not automatically lead to hygiene improvements or change the way the water is used.<sup>64</sup> It is important not only to provide access to water but also to implement education strategies to explain how the water can be used.

In Australia, running water is available in most communities. A census of each house—to see if pipes, taps, toilet and shower facilities are in working order—would help ensure that household members can use the available water.

The presence of a properly maintained swimming pool in the community has been shown to help reduce scabies, upper respiratory tract infection and trachoma.<sup>65</sup>

### 5.5.2 FLIES

Flies are an important vector in trachoma transmission, although hyper-endemic trachoma can still occur in communities with low fly densities or no flies.<sup>22</sup>

In trachoma-endemic areas, flies are frequently seen around children's faces and eyes, where they feed on mucus and discharge. A recent study in the Gambia<sup>66</sup> showed a strong relationship between flies and the transmission of trachoma. It also demonstrated the impact of fly-control programs: insecticide spraying reduced the prevalence of active trachoma and the number of new cases of the disease in the intervention villages when compared with the control villages.

Various studies have shown that ‘unclean environments’—those in which there is uncollected garbage or excreta—attract and foster the proliferation of flies.<sup>2</sup>

An increased number of flies around a house is a predictor of the presence of infection<sup>67,7</sup>, although the usefulness of this as a predictor may vary with different environmental conditions.<sup>68</sup> Flies on children’s faces were consistently associated with increased risk of trachoma in a study of six villages in Tanzania. This may be an easier measure than assessing the number of household flies; it is also less intrusive.

Several types of flies are implicated in the transmission of trachoma: *Musca domestica* and *M. sorbens* have both been shown to transfer infectious nasal and ocular discharges from person to person.<sup>69,70</sup>

A recent study examined whether there was a consistent relationship between fly populations and the presence of trachoma in three Aboriginal communities in north-western Australia.<sup>63</sup> In Australia *M. domestica* and *M. vetustissima* (the bush fly) are most prevalent and are closely associated with human communities. The bush fly, like *M. sorbens*, has eye-seeking behaviour. It is also a passive vector of *C. trachomatis*.<sup>71</sup> The study<sup>63</sup> confirmed the presence of bush flies in the surveyed communities. Fly numbers were consistent across the communities and were greatest in the wet season, which is the peak season for trachoma.

Fly levels have also been associated with cattle dung. Limiting dung volumes by introducing dung beetles can reduce fly levels.

It is probable that fly control through environmental improvement would have a significant impact on the occurrence of trachoma in particular communities and would assist with the reduction in other diseases such as diarrhoea.

The World Health Organization has reviewed the role of environmental interventions<sup>2</sup>—such as proper construction and use of pit latrines and keeping cattle away from human dwellings<sup>56</sup>—that can reduce the prevalence of trachoma through controlling fly populations. Other studies have also demonstrated the protective effect of these interventions.<sup>72,73</sup>

### 5.5.3 RECOMMENDED INTERVENTIONS FOR REDUCING THE FLY POPULATION

The following interventions are recommended for reducing the fly population:

- s multiple insecticide spraying, although this may be difficult to sustain in the longer term and may not be necessary in most Australian communities;
- s well-maintained, functioning toilets;
- s covered latrines to limit fly-breeding sites, which can substantially remove the population of eye-seeking flies;
- s proper disposal of household and village or community rubbish;
- s animal care.

### 5.5.4 COMMUNITY-LEVEL ENVIRONMENTAL INTERVENTIONS: WATER SUPPLY, SANITATION AND HOUSING

To bring about environmental change it is necessary first to identify in a given community the problems that need to be resolved. This can only be done in consultation with the community and by helping the community to identify its needs and priorities.

The water source and supply for a community needs to be assessed, as do attitudes about water use for personal hygiene, general cleanliness and sanitary practices. It may be necessary to promote improved water use and sanitation. Building water-storage tanks might be helpful in some communities. Similarly, ensuring that showers, washing machines and hot water services all work is important.

In addition, cleaning up housing areas and yards and maintaining or enabling houses to be maintained so that equipment and services function are important. The planting of vegetation and shade trees could provide expanded sleeping areas and so reduce crowding. A further benefit from planting vegetation around houses, in public places and along roads is that it assists with dust control: dust aggravates the symptoms of eye disease.

5.5.5 HOUSEHOLD-LEVEL ENVIRONMENTAL INTERVENTIONS:  
LATRINES, RUBBISH AND ANIMALS

The presence of pit latrines in houses—even when the latrines are full and unscreened—has been shown in Egypt to result in a reduction in trachoma prevalence.<sup>19</sup> In the Australian Housing for Health project, the presence of functioning toilets was shown to be important, particularly when house populations are high.<sup>70</sup> In the Australian study pit toilets were not always well accepted, so care needs to be taken to ensure their acceptance if they are proposed for installation in communities. Pit latrines can, however, be valuable if there is no guaranteed water supply. It may be necessary to show community members how to use their own resources and expertise to construct a pit latrine.

Householder members should be shown how to deal with waste and garbage in a way that discourages fly breeding. Garbage dumps might need to be constructed away from living areas.

Communities should be educated about the role of animals—both domestic and farm—in the transmission of germs and about dung and excreta providing a breeding ground for flies.

## *Appendix A*

### *Sample Survey Form*

The following sample survey form is recommended by the World Health Organization.

<b>SURVEY OF TRACHOMA</b>					
Examiner:					Community:
Subject Examined:					Household No.:
					Sex:
Enter one of the two following symbols for each sign:					0=Absent 1=Present
	<b>TF</b>	<b>TI</b>	<b>TS</b>	<b>TT</b>	<b>CO</b>
Right Eye					
Left Eye					

## *Appendix B*

### *Surgical Procedures for Trichiasis*

*The following description is based on the training manual developed by the World Health Organization for surgery for trichiasis.<sup>43</sup>*

#### **B.1 THE SURGICAL SETTING**

Where possible, the procedure should be provided within the community and close to where the patient lives; for example, at the local health centre. The benefits are that surgery is performed more promptly and may be more acceptable to the patient and the community and the costs of transportation are reduced.

If it is not possible or appropriate to perform the surgery within the community, patients will need to be sent or brought to the nearest hospital or surgical clinic.

Appendix C provides information on the equipment, consumables and preparation required for the surgical intervention.

#### **B.2 Surgical Techniques**

##### **B.2.1 LOCAL ANAESTHETIC**

The anaesthetic usually used for the procedure is lignocaine 2% (lidocaine). It is preferable to open a new ampoule for each patient, but if a bottle is used then it must be kept sterile. Use only 3 ml of the lignocaine and never use more than 5 ml per eye.

The lignocaine is injected into the plane of the upper lid of the eye that is to have the surgery, about 3 mm above the lid margin. Test that the anaesthetic has taken after three minutes. The patient should not feel any pain but may feel movement. If pain is felt, inject another 1 ml of lignocaine but no more than 5 ml in an operation.

##### **B.2.2 INCISION AND WOUND CONSTRUCTION**

###### *Fixing the Eyelid*

In order to be able to evert the eyelid, it is necessary to secure the upper lid using haemostats at the medial and lateral end of the eyelid.

### *Incising the Eyelid*

#### s **Incising the skin and muscle**

Incise the skin and muscle between the haemostats, parallel to the lid margin and 3 mm above it. The depth of the incision must be superficial, to the tarsal plate; care must be taken not to damage the eyeball.

#### s **Incising the conjunctiva and tarsal plate**

Evert the eyelid, then incise the conjunctiva and tarsal plate between the haemostats and through its full thickness, parallel to the lid margin and 3 mm above it.

#### s **Uniting the incisions**

Elevate the lid with the haemostats, then insert the points of the closed scissors into the incision in the conjunctiva tarsal plate, through remaining intact muscle, and out through the skin muscle incision.

Open the scissors while still holding them across the lid and thereby spread the muscles apart. Repeat along the incision until it is a full-thickness hole.

Remove the haemostats using firm pressure with a sterile swab to stop any bleeding.

#### s **Completing the incision medially and laterally**

Open the incision by grasping and elevating the skin of the lid margin near where you intend to cut with toothed forceps.

Use the scissors to completely divide the medial and lateral edges of the tarsal plate (that portion formerly held by the haemostats), cutting parallel to the lid margin. Do not cut much beyond the edge of the tarsal plate medially: the marginal artery may be cut.

At this stage the eyelid will be divided through its entire thickness, 3 mm from and parallel to the lid margin but connected at each end. The 3-mm lid margin portion is the distal fragment, the remaining portion the proximal fragment.

### *Suturing the eyelid*

The purpose of the sutures is to re-attach the distal fragment in an outwardly rotated position so that the eyelashes no longer rub on the cornea. To achieve this, the sutures are anchored on the conjunctival

surface of the proximal fragment and then run over the distal tarsal plate to exit through the skin near the eyelashes, drawing the lash margin outwards and upwards.

4/0 silk is suitable for suturing, and sutures with needles at both ends are needed. Unless double-armed sutures are available the sterile needles will need to be threaded onto the suture. Three sutures—that is, six needles—are used.

**s Placing sutures in the proximal fragments**

Mount the needle to point toward you, draw back the skin of the proximal portion of the eyelid, and grasp the cut edge of the tarsal plate with toothed forceps. The edge can then be everted to insert the sutures.

Pass the first needle and suture through a 1-mm bite of tarsal conjunctiva and a quarter of the thickness of the tarsal plate, near the middle of the eyelid. The needle will emerge from the cut edge of the tarsal plate.

At the other end of the same suture, the second needle is passed through the conjunctiva and tarsal plate in the same way, so that the suture is symmetrically placed at the centre of the eyelid.

Place a haemostat on the two strands of suture and draw it upward to display clearly and fix firmly the cut edges for subsequent sutures.

Pass double-armed sutures in an identical manner on either side of the first, to reach the medial and lateral ends of the incision. If this is not done, trichiasis will recur at either side.

**s Placing the sutures in the distal fragment**

Look down at the skin surface of the eyelid's distal fragment (bearing the eyelashes), remove the clip from the middle and mount one needle in the needle holder to point away from you.

Pass the needle through the muscle layer on the front surface of the tarsal plate, to emerge through the skin about 1 mm above the eyelashes. The entry point should correspond with the site of the suture in the proximal eyelid fragment.

Repeat this process with a second needle on the same suture, again matching the entry point with the exit on the proximal fragment. Clip the two ends of the suture together again. Repeat with the two other sutures on the medial and lateral sides.

s **Tying the sutures**

Tie the central suture with three single knots. Then tie the other two sutures in the same way—tying them firmly enough to produce a slight over-correction.

Cut the sutures 3 mm above the knot to avoid irritation to the eye.

s **Skin sutures**

Skin sutures need have only a needle at one end. Two or three sutures are placed to close the skin, passing into the skin 1 mm from the other cut edge. They are tied, without tension, and cut.

The final result will show an eyelid with a slight over-correction and the eyelashes pointing well away from the eye all along the edge of the eyelid.

*Completing the procedure*

s **Applying the antibiotic and dressing**

Apply tetracycline ointment into the conjunctival sac and into the wound; pad the eye and bandage it if desired. Paracetamol can be given for pain: two x 500-mg tablets immediately and with eight further tablets for the patient to take home.

The patient should be advised to rest for one or two days.

After the operation has been performed, the instruments are cleaned and sterilised using steam sterilisation.

**B.2.3 POST-OPERATIVE CARE**

The day following the surgery the wound should be checked. The pad should be removed and the eye cleaned with gauze and saline. Re-apply tetracycline ointment between the lower lid and the eyeball. The patient can be shown how to do this, so that the ointment can be applied twice daily for the next seven days.

On day 8 the sutures can be removed after the eye is cleaned.

#### B.2.4 COMPLICATIONS

##### *Complications during the procedure*

###### s **Bleeding**

If bleeding cannot be controlled by pressure with a gauze swab, the marginal artery may have been severed. Locate the source, secure with a haemostat, and tie with a suture just below the haemostat to close the artery. Alternatively, undersew the area with a suture.

###### s **Division of the eyelid margin**

Division of the eyelid margin is most unlikely to occur. If it does, the distal fragment will need to be sutured together.

###### s **Over-correction**

If the lid margin is grossly everted, remove the skin and tarsal plate sutures and repeat the suturing; this time, tie with less tension.

###### s **Under-correction**

If the eyelashes still touch or nearly touch the cornea, remove the tarsal plate sutures and repeat the suturing, tying the sutures with more tension to produce a mild degree of over-correction.

##### *Post-operative complications: within 48 hours*

###### s **Renewed bleeding**

Renewed bleeding can be controlled by firm pressure with the heel of the hand, through the dressing onto the eye. Patients and relatives should be shown how to do this if bleeding occurs at home. If the bleeding is severe or persistent, the patient should be referred to a doctor.

###### s **Local infection**

In cases of local infection, any involved sutures should be removed and the wound cleaned with gauze and boiled water three times daily.

###### s **Cellulitis**

If the patient has pain, spreading redness, fever and a raised pulse, antibiotics will be necessary and urgent referral to a doctor is essential. Hospital admission may be required.

s **Excessive rotation of the tarsus**

The distal strip of the eyelid margin may be so rotated that it has turned right up. This can be caused by:

- too big a distal fragment—that is, an incision much more than 3 mm from the lid margin;
- excessive tension on the tarsal rotation sutures;
- the sutures emerging within the lashes rather than above them.

If the eyelids do not close properly or the cosmetic appearance is distressing, the sutures should be removed and the upper lid massaged downwards. A second operation may be necessary to correct the excessive rotation: defective lid closure is a serious condition.

*Post-operative complications: after 48 hours*

s **Granuloma formation**

A granuloma looks like a red lump on the conjunctiva over the wound. It can be excised with a scalpel or scissors after applying anaesthetic drops. Remove any remaining sutures at the site.

s **Necrosis of the eyelid margin**

Necrosis of the eyelid margin is caused by poor blood supply resulting from too narrow a distal fragment. It will gradually heal without treatment.

## *Appendix C*

### *Equipment, Consumables and Preparation*

*The following instruments and sutures are required:*

- s large metal bowl or plastic bucket
- s two kidney dishes
- s galley pot
- s container for sterile water
- s scalpel holder for no. 15 blades
- s packet of no. 15 blades
- s needle holder (without catch)
- s toothed forceps
- s two pairs of scissors (straight, with blunt ends)
- s two small haemostats ('mosquitos')
- s six cutting-eyed needles for 4/0 silk suturing of eyelid
- s 4/0 silk 90-metre reel (sufficient for 200 operations)
- s operating loupes x2 magnification will also be useful.

*The following consumables or their equivalent should be available:*

- s tetracycline 1% eye ointment
- s topical anaesthetic—for example, amethocaine eye drops
- s solution for disinfecting the instruments—for example, glutaraldehyde 2%
- s sterile distilled water or normal saline
- s povidone iodine 10% for skin preparation
- s 21G disposable needles
- s 5-ml disposable syringes
- s surgical gloves
- s gauze
- s zinc strapping—1/2 inch/1.25 cm
- s sterile drape approximately 1 metre square with a central hole 10 cm square made of linen or sterilised paper.

**The instruments must be sterilised or receive high-level disinfection before each operation.**

### *Explanation*

Explain to the patient what the operation is for and what will happen. Obtain the patient's consent to the surgery and ask him or her to sign the consent form. If the patient cannot understand English it will be necessary to ensure that the procedure is explained and consent obtained with the assistance of an interpreter. It may be helpful to have the consent form translated into the local language(s).

- s Wash the patient's face with soap and clean boiled water— especially the eyelids, forehead, temple, cheeks and nose.
- s Have the patient lie down on the operating table or bed.
- s Explain to the patient that he or she
  - should lie quietly during the procedure,
  - ought not to feel pain during the operation but to tell you if they do,
  - will have clean towels covering their face and chest so that the operation is clean,
  - must not move the towels or try to touch the eye or the surgeon.

### *Apply anaesthetic drops to the eye*

#### *Sterile preparation*

- s The instruments, the surgeon's hands, the hands of any assistants and the patient's skin must be sterilised. Under ideal conditions, use proper surgical scrubbing solution such as HIBICLENSE™, chlorohexidine 40 mg/ml, isopropyl alcohol 40 mg/ml, or similar.

## Appendix D

### Health Promotion Materials

[The following information comes from Indigenous Health Promotion Resources: a national guide for Aboriginal and Torres Strait Islander health workers (2nd edition), a special publication of the Aboriginal and Islander Health Worker Journal (PO Box 502, Matraville NSW 2036).]

#### Poster

TRACHOMA Explanation of the clinical signs represented through a painting

CREATED BY Mrs Jennifer Summerfield, Nganampa Health Council

PRODUCED BY Nganampa Health Council Inc.

CONTACT Nganampa Health Council  
PO Box 2232, Alice Springs NT 0871  
PHN 08 8952 5300  
FAX 08 8952 2299

#### Video

*SHOWER BLOCK (UPK)* Music video clip

PRODUCED BY Nganampa Health Council Inc.

CONTACT Nganampa Health Council  
PO Box 2232, Alice Springs NT 0871  
PHN 08 8952 5300  
FAX 08 8952 2299

#### Video

*JABBY'S FRIEND* Teaches Jabby and his grandson about how to prevent trachoma and blindness.

PRODUCED BY Desert Pictures with the Kimberley Public Health Unit (1995).

CONTACT Director, Kimberley Public Health Unit  
PMB 912, Derby WA 6728  
PHN 091 911 144  
FAX 091 931 378

***Flip Charts***

*IRIS AND LENS* Characters explain trachoma and its prevention  
PRODUCED BY Kimberley Public Health Unit, Aboriginal Health  
Promotion and Disease Control (1995)  
CONTACT Director, Kimberley Public Health Unit  
PMB 912, Derby WA 6728  
PHN 091 911 144  
FAX 091 931 378

***Sticker***

Information about how to look after your eyes and stop trachoma  
PRODUCED BY Kimberley Aboriginal Medical Services Council,  
HEAT Works  
CONTACT Kimberley Health Promotion Unit  
PO Box 1377, Broome WA 6725  
PHN 091 936 043  
FAX 091 922 500

***Book***

*HOUSING FOR HEALTH:*  
*Towards a healthy living environment for Aboriginal Australia*  
PRODUCED BY Nganampa Health Council Inc.  
CONTACT Nganampa Health Council  
PO Box 2232, Alice Springs NT 0871  
PHN 08 8952 5300  
FAX 08 8952 2299

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# ADVOCACY FOR THE PRESERVATION AND RESTORATION OF VISION

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## REPORT ON ADVOCACY FOR THE PRESERVATION AND RESTORATION OF VISION

Hugh R. Taylor, M.D.

### **1. Overall Perspective:**

There are two key roles for international ophthalmology to play in terms of advocacy. The first is to participate actively in the Global Initiative—Vision 2020, and the second is to provide information to national ophthalmic societies through the International Federation of Ophthalmological Societies (IFOS).

#### 1.1 VISION 2020

The International Council of Ophthalmology (ICO) has become an active member of the Vision 2020 Task Force. This is a key development and now puts ophthalmology actively in the international program. Many of the objectives set out in the *International Ophthalmology Strategic Plan to Preserve and Restore Vision: Vision for the Future* parallel and iterate the plans and objectives of Vision 2020. International ophthalmology needs to continue to provide active leadership and ophthalmic input into Vision 2020 as it develops.

#### 1.2 INFORMATION AND ADVOCACY TO NATIONAL SOCIETIES

An outline of material that could be sent to national societies has been developed, but to my knowledge has not yet been distributed. I believe that this important administrative responsibility should be the specific

responsibility of an individual who would prepare material and provide it under the auspices of the ICO/IFOS to national groups. This would require a liaison function and ongoing attention and coordination.

The appointment of a part-time Executive by the International Agency for Prevention of Blindness (IAPB) to coordinate the World Sight Day activities provides a useful model as to how this activity should be conducted.

I believe it is of absolute importance that the ICO/IFOS utilise its connections and network with national ophthalmic groups to inform them of the international activities in Vision 2020 and to coordinate these activities.

## **2. Progress on Task Force Action Plans:**

### 2.1 OPTHALMOLOGICAL AWARENESS AND COMMITMENT

Little activity has occurred in this area, and I believe that increasing public awareness of blindness prevention is a key area that requires secretariat input as outlined above.

### 2.2. NATIONAL STATISTICS AND PRIORITIES

It is undoubtedly important that blindness data be collected and made public on a national level. I am not sure that there is a key role for the ICO to do this directly.

On the one hand, action could and probably should be initiated through the World Health Organization (WHO) to ask member states to report blindness statistics and prevention activities. This reporting would make an important change in the priority given to blindness. Systematic reporting is an issue that should be taken up with the IAPB and other members of Vision 2020 to encourage preparation of a position statement to present to the WHO.

On the other hand, national societies should also be actively encouraged to request their national governments to collect and collate blindness data. An annual review of progress should be incorporated into World Sight Day activities.

### 2.3 ECONOMIC BENEFIT

The need for data on the economic impact of vision loss and the economic benefit gained from prevention of blindness activities is of critical importance. Assembly of this data will require specific research

studies, and although the ICO can highlight the importance of these activities, I do not believe the ICO itself will contribute to the generation of these data. ICO advocacy should be to the Vision 2020 group to keep the need for this research in a prominent position and also to encourage national societies to try to obtain such data at a local level.

#### 2.4, 2.5 ALLIANCE—VISION 2020

A close working relationship has already been established with the ICO joining the Vision 2020 initiative, and this close working relationship needs to be actively continued. Participation in Vision 2020 is seen to be the key.

#### 2.6, 2.7 SCREENING PROGRAMS AND EYE CARE PROGRAMS

These activities really need to be conducted at a national or a local level rather than the international level. The role for the ICO is to provide information and material that would be of assistance to national societies. This could partly be achieved through the ophthalmic awareness and commitment activities as mentioned above, and also through the distribution of clinical practice guidelines.

### **3. World Sight Day**

October 12, 2000, the second Thursday in October, has been designated World Sight Day and members of Vision 2020 are actively supporting this initiative. This year's activities will include a major event in Beijing and other meetings, publicity events and screening activities in a variety of countries.

Vision 2020 has employed Isabel Gander as a coordinator for these activities. The ICO has not been able to fully utilise this opportunity this year, and will need to develop better links with its national societies to help inform them so that they can engage with other groups in their country to coordinate World Sight Day activities.

*August 1, 2000*

INTERNATIONAL COUNCIL OF  
OPHTHALMOLOGY ADVOCACY  
SUB-COMMITTEE ON VISION 2020  
PLAN OF ACTION

*“If ophthalmology is your profession,  
the prevention of blindness is your business”*

MEMBERSHIP

Francisco Contreras, M.D.; Marilyn T. Miller, M.D.;  
Volker Klauss, M.D.; Hannah B. Faal, M.D.; Lalit Dandona, M.D.;  
Hugh R. Taylor, M.D.; with Gottfried O. H. Naumann, M.D.;  
Ramachandra Pararajasegaram, M.D.; and Björn M. Thylefors, M.D.

MISSION

Through the IFOS/ICO, the mission of the sub-committee is to foster support for the Global Initiative—Vision 2020.

AIM

The aim is to increase the awareness of Vision 2020 amongst ophthalmologists worldwide and encourage their support.

OBJECTIVES

1. By June 2001, have information about Vision 2020 reach “every ophthalmologist in the world.”
2. Thereafter have progress information about Vision 2020 reach “every ophthalmologist in the world.”

## STRATEGIES

1. Develop a Vision 2020 information pack to go to the secretaries of all IFOS nationally affiliated societies.
2. Encourage national societies to disseminate material about Vision 2020 to all their members by inclusion of material in national or subnational meetings, newsletters and other appropriate methods.
3. Provide a range of possible activities—“list of opportunities”—that could be taken by interested parties to support Vision 2020.
4. Request the identification of a national Vision 2020 liaison person.
5. Coordinate closely with the IAPB/WHO with regard to Regional Planning Workshops.
6. Update this material on a regular basis.

## MATERIAL TO BE DEVELOPED

1. Information kit
  - § Cover letter to explain Vision 2020, request that a National Advocacy Committee be established and request the name of the national coordinator
  - § Slide set and text/videos WHO/IAPB
  - § WHO press kit, available from WHO
  - § Suggested advocacy action
  - § “Declaration of support” document, available from the Task Force
  - § Mailing list:
    - National societies
    - Country advocate
  - § List of regional and national IAPB contacts
2. Budget
  - § Develop after plan of action approved
  - § Submit to IAPB Task Force for consideration

*January 3, 2001*

# ECONOMIC BENEFITS OF OPHTHALMOLOGIC CARE AND PROGRAMS TO PREVENT BLINDNESS AND PRESERVE AND RESTORE VISION: OUTLINE FOR A POSITION PAPER

David Green

## *Purpose*

Provide economic, social and humanitarian rationale to encourage health care planners and governments to allocate the resources necessary for the eradication of blindness; and to demonstrate how it is possible in a developing country setting to establish financially self-sustaining, high-quality eye care that is affordable and accessible to poor people.

## *Introduction*

In developing countries, a large percentage of the population is poor and does not have health insurance. Very often government infrastructure is inadequate to provide high-quality, high-volume health care services commensurate with the magnitude of the problem. Increasingly, international and local non-governmental organizations (NGOs), dependent on donations for operating costs, are finding it difficult to obtain financing to maintain operations or expand service delivery.

Developing eye care that is affordable and accessible to the poor, and financially self-sustaining from user fees requires careful investigation of the economics of eye care delivery. Factors to be examined include: understanding the local peoples' capacity to pay, reducing costs, improving efficiency and creating market demand for services through quality improvement and pricing for affordability. As with any development where the goal is financial sustainability, the objective is to increase volume to lower unit costs *and prices* while maintaining high quality and affordability.

Eye care with an emphasis on cataract surgery is one of the few health care services that can become financially self-sustaining from user fees while maintaining an orientation to serving the poor. Cataract accounts for approximately 60%–80% of blindness and is the primary income generating procedure performed by ophthalmologists worldwide. In other large-scale public health programs that are prevention oriented, it has been learned through many failures at cost recovery that people are unwilling to pay for prevention. For other curative services, the expression of the disease and its treatment are more variable from patient to patient as compared to cataract surgery which is the same in each case: costs are the same for each patient and can be made affordable to the poor (as compared to other chronic and acute disease entities which are costly in their treatment and where there is insufficient volume to reduce the unit cost and have economy of scales). Because of the large number of people requiring cataract surgery in developing countries, it is one of the few secondary care procedures that has the potential for paying for itself through user fees.

In the newly emerging economies of developing countries, there is a substantial proportion of people who are willing and able to pay for cataract surgery at present market prices. There is an even greater proportion who could afford to pay for the cost of cataract surgery with intraocular lens (IOL) provided the cost of the product is lowered through efficient and effective use of resources in a high volume setting. In these times of ever increasing competition for limited government health care resources, cost recovery can become the development paradigm for comprehensive eye care development. Revenues from cataract surgery and refraction can subsidize services to those too poor to pay as well as support delivery of other eye care services and procedures that do not have the potential to become self-sustaining from user fees by themselves.

#### PRESENT MAGNITUDE AND MAJOR CAUSES OF VISUAL IMPAIRMENT

An analysis of the available data on blindness and low vision put together by WHO shows that there are nearly 45 million blind people and almost 110 million have low vision, resulting in nearly 135 million people with some degree of visual impairment. The major cause of blindness in India, China and sub-Saharan Africa is cataract. Globally, there are at

least 16 million people who are blind from cataract. Unoperated cataract has been shown to be the major cause of blindness, accounting for 50%–80% of all causes of blindness in the available population-based surveys. For every person blind from cataract, there are probably three more cases who are severely visually disabled due to cataract.

#### SOCIOECONOMIC ASPECTS OF BLINDNESS (DATA FROM THE WHO)

In addition to being a public health problem, blindness and visual impairment have important socioeconomic implications. The costs of rehabilitation and care may be the most apparent. Equally important are the indirect costs resulting from the loss of productivity.

There is a growing trend worldwide to evaluate disease and disability prevention on the basis of costs incurred and benefits accrued. Public health interventions to prevent blindness are particularly revealing in this respect, as cost savings and return on investment accrue, because of the avoided rehabilitative costs, on the one hand, and the gains in productivity, on the other.

#### **The Financial Burden of Avoidable Blindness**

Accurate data on the total economic and social costs of blindness and severe visual impairment are not available. Moreover, the cost estimates vary widely from country to country, based on the prevalence and causes of blindness, the age of those affected, the employment situation in the country concerned, the wage structure, and the existence and coverage of social, rehabilitative and educational services. However, in every country such costs have been shown to be a considerable strain on the national economy.

- s In 1990, the aggregated cost of blindness to the federal budget in the United States was estimated to be approximately **US\$4.1 billion**. A minimal federal budgetary cost of a person-year of blindness (vision less than 6/60 in the better eye) for a working-age adult was estimated to be **US\$11,896**.
- s More importantly, it has been estimated that in the United States, if all the avoidable blindness in persons under 20 and working-age adults were prevented, a potential saving of **US\$1.0 billion** per year would accrue to the federal budget.

- s In a study from India in 1989, a conservative estimate of the aggregated costs of blindness to the national economy, including a minimal subsistence allowance for the blind, amounted to approximately **US\$4.6 billion** per year.

### **Social implications**

The economic burden of blindness and visual impairment is only part of the story. The person who is blind and his/her family face important social constraints. Both directly and indirectly, visual impairment interferes with various activities of daily living. Blind children have to face developmental challenges. In adult life, employment opportunities for the visually disabled are extremely limited and their participation in a host of leisure activities is seriously hampered. In addition, in many societies visual impairment results in a loss of status and self-esteem. These physical and, especially, the psychosocial implications of visual impairment and blindness cannot be accurately quantified in monetary terms. However, they do erode the quality of life of both the affected individuals and their families.

A study in the UK indicated that visually disabled people were poorer on average, had lower educational levels, lower employment and less social life than sighted people. These findings probably hold true in all societies. Also, in African settings, it has been reported that blind persons die earlier compared to the sighted population.

The Nepal blindness survey showed that life expectancy of blind people was three years.

### **Prevention**

Some examples of cost-effective public health interventions to prevent blindness include:

#### **CATARACT SURGERY**

- s Cataracts are the most common cause of avoidable blindness. Worldwide, there are an estimated **16 million** persons who are blind as a result of cataracts. The majority of these people live in the rural areas of economically developing countries. The burden on the country is significant.
- s In the absence of any preventive measures that can be applied in a public health setting, the only recourse is surgery. Cataract surgery is

a highly cost-effective intervention: generally sight is restored after a relatively low-cost operation. The costs of cataract surgery vary depending on the country, the technology used, and whether the surgery involves hospitalization.

- s With recent trends in making intraocular lenses available at costs as low as US\$10, the overall cost of surgery has steadily decreased, and there is a rapidly growing popularity for such surgery even in the developing countries.
- s A South Asian study revealed that not only did 85% of the men and 58% of the women who regained their sight return to work, but that there was also a financial return of 1500% on the expense in the year following surgery. (*Reference: World Bank Data*)
- s The cost-effectiveness of cataract surgery has been demonstrated worldwide. In addition to the restoration of sight, there is an enhancement of the quality of life. Cataract surgery costs have therefore been evaluated per quality-adjusted life year (QALY) gained. In comparison with other common public health interventions, cataract surgery has been ranked as one of the most cost-effective means offered to adults in the developing world using available technology.

#### ONCHOCERCIASIS CONTROL

The economic returns on investment in the control of river blindness (onchocerciasis) through the Onchocerciasis Control Programme (OCP) in West Africa are impressive. Covering 11 Sahelian countries, it has helped to protect 30 million people, including more than 10 million children born since 1974, from river blindness, at a cost of US\$1 per year per person of the total population.

- s Over 1.5 million seriously infected persons have recovered fully, and it is estimated that by the turn of the century nearly half a million people will have been prevented from going blind.
- s In addition to savings in terms of human sight and suffering, the economic gains are also very impressive. An estimated 25 million hectares of fertile land, once deserted on account of this disabling disease, are being resettled and cultivated.
- s It is estimated that the return on the investment of about US\$570 million—the input into the OCP from its inception to the year 2002—will be in the range of 16%–28%.

## DIABETIC RETINOPATHY

In many developed countries, diabetic retinopathy is the most common cause of vision loss in the working population. Sight-threatening retinal complications can be effectively prevented by adequate control of diabetes and through periodic ophthalmoscopic examination and laser photocoagulation when required. In many countries, health education programmes aimed at motivating diabetic patients to undergo periodic eye examinations have proven to be cost-effective.

- s In a study in the US, the annual cost of welfare benefits per patient with severe visual loss caused by diabetes was estimated to be nearly **seven times the cost per patient per year of vision saved**. The same study concluded that prevention programmes aimed at improving eye care for diabetic patients not only result in substantial federal budgetary savings but are a highly cost-effective health investments for society.

## RETINOPATHY OF PREMATURITY (ROP)

Retinopathy of Prematurity (ROP) is the leading cause of blindness among premature infants, particularly in developed and rapidly developing economies. The rise in ROP results from the increased survival of low and extremely low birth weight infants, resulting from improvements in neonatal care. Blindness occurring in infancy and childhood is a long-lasting drain, both in terms of social dependence and lost productivity. Therefore, a public health intervention that saves the sight of even a relatively small number of infants and children provides significant savings, while ensuring a better quality of life of those affected.

Blindness can be prevented in many of these infants through timely screening and treatment. Studies have demonstrated that properly timed screening and treatment for ROP in low and extremely low birth weight infants in the US result in a net cost saving of **US\$38.3 million to nearly US\$65 million per year**.

The economic and social costs of blindness must be considered from the perspective of both the disabled individual, and the country as a whole. Many of the same economic and social cost considerations apply to both developed and developing countries, although the developing countries have more limited health and social care services and hence lower overall economic resources, to bear the burden of avoidable blindness.

In this context, the need for eliminating avoidable blindness should become a public health priority. Sight-saving interventions should be seen as opportunities for investment with a worthwhile return in both humanitarian and economic terms.

#### DEVELOPMENT OF FINANCIAL SUSTAINABILITY IN EYE CARE AND EXAMPLES OF SUCCESSFUL MODELS

In the absence of strong governmental support, can patient user fees lead to financial sustainability of programs oriented to the poor? Is cost recovery from patient fees possible in the government setting or only in the private and non-governmental sectors? What are the organizational and political constraints to achieving financial sustainability? In most settings, sustainability is dependent on gaining control of:

- s Earnings
- s Hiring/firing/recruitment/retaining of staff
- s Purchasing
- s Competence to manage

Is this control possible and under what circumstances? How can governments and health planners create the proper institutional and financial structure to promote eye care services that are excellent in quality and accessible to all and not just the privileged few who can afford to pay the market price, which are often out of reach to the majority of the population?

It has been successfully demonstrated that it is possible to develop eye care programs that are financially self-sufficient and still able to provide care for the poor. Each of these successful models is designed according to the paying capacity and economy of the catchment area served:

- s At the Aravind Eye Hospital, which will perform over 200,000 surgeries in 2000, 40% of the patients pay well above cost, and 60% are given service at no charge. The institute is able to develop a substantial surplus to fuel its growth and expand services, teaching and research.
- s The Lumbini Eye Care Project in Nepal has achieved financial self-sufficiency. Since the introduction of cost recovery in late 1993, surgical volume has more than tripled from 6,000 to 20,000 in 1999;

patients receiving an IOL have increased from 50% to close to 100%; and the program is now able to be fully self-sustaining from user fees and generates a 40% surplus which it utilizes for institutional growth and free surgery to the very poor. Lumbini has multitiered pricing for different economic levels: 57% pay just above cost; 18% two-thirds cost; 5% two or three times cost; and 20% receive free surgery.

- s LV Prasad Eye Institute, Hyderabad, India: About 20,000 surgeries are performed each year; 50% pay well above cost, 50% are provided surgery at no charge to the patient.
- s Aurolab in India is dedicated to providing affordable medical products to programs serving the poor. It now produces intraocular lenses (IOLs), ophthalmic suture and pharmaceuticals. In 1999, Aurolab produced and sold over 600,000 IOLs. Aurolab has CE Mark Certification for its suture and IOL product lines, fulfilling the same regulatory requirements as any European medical device company. Aurolab has proven that sophisticated medical manufacturing can be financially self-sustaining and yet priced to be affordable to the poor. The company's affordable IOLs have both improved cataract surgery outcomes and increased market demand for the improved visual acuity while reducing the need for thick cataract glasses.

What do these programs have in common that are characteristics of self-sustaining eye care? Through careful research, they have gained an understanding of the local peoples' capacity to pay and have priced their services to be affordable to rich and poor alike. Surgical productivity and resource utilization have been enhanced to significantly decrease per unit surgical costs. Through training of paramedicals, these programs have liberated their surgeons sufficiently to increase surgical volume, thus reducing per unit costs. Each of these models varies according to the paying capacity of the local population. All have the characteristic of multitiered pricing to make eye care affordable to all economic strata, while providing care to the very poor at no charge. Prices are set according to the paying capacity of the local population.

These programs have worked hard to improve quality to increase market demand. Emphasis is placed on satisfying customers and being accountable to the client. Fee for service introduces accountability into the patient-provider equation—providers strive to satisfy the customer to gain loyalty and reputation in the market place. Consumer expectation

regarding quality and satisfaction forces providers to improve efficiency, quality and value in order to remain competitive.

## ROLE OF IOLS IN SUSTAINABILITY

Key to sustainability has been quality improvement through the introduction on a large scale of inexpensive, high-quality intraocular lenses as the treatment of choice in developing country programs. The better visual acuity afforded by an IOL over correction with aphakic glasses has played a key role in stimulating market demand for cataract services for all economic strata. Vision with an IOL attracts cataract patients to come for surgery at an earlier stage when they are still able to work and can pay for surgery. Financial self-sufficiency can be attained, as cataract surgery programs are able to recover costs from user fees.

## RULES OF THUMB IN COST RECOVERY

When we examine eye care programs that are operating at peak performance we see the 80/20 rule in effect: Approximately 80% of blindness is due to cataract; 80% of program costs are for cataract surgery; and 80% of revenue comes from cataract surgery. By applying this 80/20 rule, it makes sense to develop the per unit cost of cataract surgery as a relatively accurate tool for measuring the efficiency, productivity and quality of an eye care program.

The per unit cost is determined by adding up all operating expenses and dividing them by the number of major surgeries. The per unit cost of cataract surgery can be used as a tool for measuring efficiency and for setting goals. Cost recovery and its measurement tool—per unit cost—then becomes a ‘paradigm’ for a comprehensive planning process for developing cost effective, high-quality eye care that is accessible and affordable to the poor.

Another formula we have discovered is that people can afford to pay their monthly family income for cataract surgery with IOL. This rule seems to hold true for different economies with different standards of living and different per capita incomes.

We have also found it to be true that the cost of cataract surgery can be reduced to a level commensurate with the average monthly family income of the bottom 60% of the population.

Taking this phenomena into account, in our planning we strive to increase the volume of cataract surgery to decrease the unit cost to make cataract surgery affordable to the population. It is a planning process by numbers: we first begin with an understanding of the varying paying capacity of the population, and then we examine the production side to see how to increase productivity and market demand while lowering costs in order to arrive at a projected unit cost equal to the average monthly income of the bottom 60% of the population.

### THREE KEY POINTS FOR LOWERING PER UNIT COST OF CATARACT SURGERY

To achieve the result of lowering the per unit cost, we focus on three key points:

- s Increase the surgical volume/surgeon, and improve quality of surgical outcome. A rule of thumb is that for a high-volume setting, surgeons should be trained to do an average of two to four manual ECCEs per hour (or sutureless ECCE), with an efficient operating room staff.
- s In these successful programs there are typically five paramedicals to one ophthalmologist. This frees up ophthalmologist time to perform surgery and lowers cost by utilizing less expensive professionals.
- s Costs are lowered through intelligent purchasing of consumables, decreasing wastage and maximizing staff resources with more efficient operating procedures. In our planning, we generally try and reduce the cost of consumables for cataract surgery to about US\$15–20. This has involved intelligent purchasing and in some cases enacting technology development and manufacturing to gain the means of production for key items such as IOLs and suture in order to reduce the price to a level that is affordable to the economies of developing countries.

### PREDICTIVE MODELING METHODOLOGY

The process of developing a cost recovery model is very similar to the predictive modeling that most businesses perform in projecting costs, determining prices and estimating market share. It involves the following steps:

1. Definition of total costs: The first step is defining costs. These include: variable costs which are mostly related to the consumables for cataract surgery; fixed costs which include items such as salaries, rent, utilities, and insurance; and depreciation which is the loss in value of an asset such as equipment calculated over time.
2. Assessment of constraints to more productive service delivery: this includes accessing management expertise; skill level of staff and their training requirements; additional staff required; leadership and continuity of staff; supply and equipment needs (acquisition, inventory control, costs, needs, maximization of material resources); facility expansion/renovation requirements; and financial controls
3. Removal of constraints: The inputs to consider in the removal of these constraints include: clinical, surgical and management training; equipment acquisition; facility renovation; and improving organizational efficiency with systems development.
4. Market projections and assessment of paying capacity of population: This involves: surveys in the catchment area that determine varying income levels of population (rich, middle, poor, very poor) and the percentage of population that fall into each income bracket; defining the economic status of the population and what percentage have the ability to pay and at what price; review of outreach and interaction with various community and social groups; examination of past-user patterns of eye care services; review of existing epidemiological data on prevalence of eye disease; and review of pre-existing data/surveys in the catchment area that have ascertained the economic levels of population. The goal is to arrive at a table that determines what percentage of the population is rich, middle, poor and very poor; and what the average monthly income is for each economic strata. That average monthly income then becomes the affordable price for that group for surgery.
5. Creation of different scenarios (changing variables of price, percentage of patients per pricing category, of patients and costs) and choosing the one that most approximates reality.
6. Development of multitiered pricing system appropriate to the local economy. Different prices are set according to the level of privacy and comfort in accommodation, or type of surgery, be it manual

ECCE or phacoemulsification. It is always best if a system can be established where the patient chooses the price they will pay; however, there are instances where a social worker evaluates the patient and together they determine the price the patient is able to pay.

### THE REAL ISSUES ARE PRICE AND CHOICE

Very often discussions about making eye care accessible to poor people focus on the issue of ‘low cost’ or ‘appropriate technology’ when the real issue is price. The innovation of Aurolab is not the low manufacturing cost of the lenses; in many developed and developing countries, IOLs can be manufactured at a low cost and with high quality. Nor is it less expensive or ‘appropriate’ technology—Aurolab employs the same equipment and technology as US or European companies. The real issues are: price to make the product affordable to the targeted market (poor people with cataract); and developing distribution channels to make the product accessible to poor people.

### COMPASSIONATE CAPITALISM

The hallmark of these financially self-sustaining programs is the choice to use profit and production capacity for service delivery to the poor. It is the choice to price the product at the lowest price possible while still allowing for sustainability and sufficient resources for ongoing development. These programs are providing a service that is designed to be affordable to most or free to the truly needy and yet is not dependent on the charity of others. This concept of compassionate capitalism can be applied to other settings where there is a combination of quality services, sufficient demand from paying patients and a location of service delivery in an area of higher population density with a large proportion of the population able to pay something. It involves:

## THE EFFECT OF COST RECOVERY ON PROGRAM DEVELOPMENT

The development approach embodied in the concept of financial sustainability is a difficult one for PVOs and NGOs to embrace because of their historical dependence on donations to sustain field programs. Very often NGOs are tied to a charitable model of raising funds from donors who usually respond to an appeal made on behalf of those who are “helpless.” When an organization is invested in the charitable mentality for fundraising appeals, it often lacks the skills and mentality necessary to earn money from the sale of a product or service; it also lacks basic business planning skills necessary for development of cost recovery models.

Organizational structure and program character and direction are often determined by the source of funding—how eye care is funded affects service delivery more than any other aspect. Those who control the expenditure of resources, control program planning and direction. With external funding, program direction often remains in the hands of the donors and not the project; and spending often occurs with little thought to the desired result. This is in contrast to earned income, which is difficult to obtain, and often more wisely spent.

When a program begins to earn its own income, staff attitudes change as a program begins to generate its own resources: staff become more empowered and motivated when there is ownership. Linking decision making to income generation and management of financial resources leads to the development of program planning skills: those who are performing the work know their business the best and become better managers when they are in control of decision making which affects financial viability and program sustainability.

Emphasis is placed on satisfying customers and being accountable to the clients. As in any business, if the client is satisfied, the business thrives. This is in marked contrast to service delivery settings which are ostensibly ‘free’ where there is no monetary exchange between the client and the provider—if the patient doesn’t have to pay for services, very often the provider doesn’t feel accountable for the result. The simple act of charging a fee for service introduces accountability into the patient-provider equation—providers strive to satisfy the customer to gain loyalty and reputation in the market place. Consumer behavior

and expectation regarding quality and satisfaction transforms service delivery—through their choice of eye care provider, consumers become program planners as they force providers to provide quality and affordability.

In almost every developing country in the world, there is a tremendous backlog of blindness due to cataract, which accounts for 50% to 80% of blindness and visual disability. Top-down planning approaches have been unsuccessful in ameliorating the problem of cataract blindness in any significant way. The bottom-up, market-driven approach fostered by cost recovery planning approaches will hopefully transform service delivery such that surgical volume increases as quality cataract surgery becomes affordable and is sought after by the poor who otherwise would not be able to afford cataract surgery at present market prices.

By embarking on the path to cost recovery, organizations begin the transition from utilizing organizational resources for operating costs (re-inventing cash flow each year from donations to continually pay for operating expenses) to resource utilization for capital expenditures, new developments and, most importantly, expanding service delivery to the truly undeserved. The ‘Sustainability Model’ is a good example for donors and governments to see how they can use their precious resources for start-up costs (which are least attainable in a developing country) instead of for operating costs (which are attainable in most areas of the developing world).

## RELATIONSHIPS AMONG COLLABORATORS

The role of attitude and empowerment are key factors in enabling change. The status of organizational structure, management and pre-existing bureaucratic imperatives promotes or inhibits movement towards cost-effective, high-volume, quality eye care. The key issue is: what kind of foundation and motivation is built into the present approach which may act as incentive or disincentive towards excellence and how can the motivating forces be transformed within the presently operative bureaucratic constraints?

In the development approach that we are attempting to foster, those ultimately responsible for carrying out change and development are involved from the start in reflecting on their present circumstance and constraints and in being guided to formulate for themselves a recommended course of action that takes into account their unique local circumstances. Local ophthalmologists and other key decision makers of the community are encouraged to take the lead in defining their present situation and constraints and develop a course of action to transform and improve service delivery. They must define and set their course of action if ownership is to be accomplished.

*References:* World Health Organization Publications and Information Statements

*January 2, 2001*

## RESEARCH IN OPHTHALMOLOGY AND VISION

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**POLICY STATEMENT:**

**RESEARCH IN VISION AND OPHTHALMOLOGY**

**Alfred Sommer, M.D., M.H.S.**

Tens of millions of people can see, carry out their daily tasks and enjoy life more fully because ophthalmic research has provided new and better ways to treat and prevent major causes of visual impairment and blindness. Ophthalmologists employ effective tools and techniques undreamt of a generation ago.

Despite these achievements, the number of blind in the world keeps growing, in part because techniques generated by past research are too expensive and complicated to be applied in poorer parts of the world, and in part because the world's population is living longer and suffering from chronic blinding conditions for which we do not yet have effective treatments.

It is therefore important that ophthalmology continue to advance its capacity to treat and prevent visual disability and blindness through commitment to, involvement in, and support of a vigorous global research program. Those societies with a sophisticated basic research infrastructure should apply the revolutions in molecular and cellular biology, genomics and computational power to tackle complex diseases, like age-related macular degeneration, for which we do not yet have any effective treatment or means of prevention; and diseases like primary open angle glaucoma, for which existing therapy is of limited value.

All countries, rich and poor alike, will benefit from new, more efficient and practical ways to apply technologies and insights already at hand. These include strategies for eradicating blinding entities, like trachoma, that were vanquished from wealthier nations; as well as less

costly ways to achieve high quality outcomes from the treatment of cataract, diabetic retinopathy and similar afflictions now achieved with more expensive tools and techniques.

Ophthalmology has achieved extraordinary professional progress through a robust research enterprise. The profession has aggressively searched for better solutions to well-recognized old diseases and emerging new diseases and disabilities that effect the eye and visual system. As a global profession, we must redouble our research efforts to better serve those who can benefit from ophthalmic knowledge and practice.

*January 3, 2000*



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**International Ophthalmology  
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and Restore Vision—  
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**International Ophthalmology**  
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