THE VISION 2020 HANDBOOK ON

equipping a secondary eye hospital

A VISION 2020 The Right to Sight INDIA Publication

Developed by
LIONS ARAVIND INSTITUTE OF COMMUNITY OPHTHALMOLOGY
ARAVIND EYE CARE SYSTEM

A VISION 2020 HANDBOOK ON

equipping a secondary eye hospital

A Publication of VISION 2020 The Right to Sight, INDIA

Developed by

LIONS ARAVIND INSTITUTE OF COMMUNITY OPHTHALMOLOGY

ARAVIND EYE CARE SYSTEM

Published by
VISION 2020 The Right to Sight
S-390, Double Storey, Ground Floor
New Rajinder Nagar
New Delhi - 110 060; India
Phone : 91-11-42411542 / 42411518
Fax :91-11-42412107
www.vision2020india.org

Developed by
Lions Aravind Institute of Community Ophthalmology
Aravind Eye Care System
72, Kuruvikaran Salai, Gandhi Nagar
Madurai - 625 020; India
Phone: 0452 - 435 6500
Fax : 91-452-253 0984
www.aravind.org

Printed at
Leo prints, Madurai

June 2008

Preface

With the rapid advancement of technology over the last decade, the field of Ophthalmology has grown to be significantly equipment - intensive both in the diagnostic and surgical areas. Refractive errors and cataract continue to account for significant workload in eye care. Over the years these two conditions have become the focus of secondary level eye care settings where bulk of the curative eye care is delivered.

However, from a quality perspective it is important to go beyond cataract and refractive errors to ensure comprehensive eye examinations and appropriate service delivery that includes referral care. Thus for both diagnoses and treatment, a secondary eye hospital needs to be equipped with a comprehensive range of equipment.

The term "secondary hospital" is not very well defined, and may refer to anything from a basic cataract clinic, to a hospital offering more advanced care. Hence several factors need to be taken into consideration when equipping a secondary eye hospital in terms of what equipment and how many of each. The major factors are:

- range of clinical services that the hospital plans to offer
- the clinical protocols to be followed and the estimated work-flow
- the daily patient load the hospital expects
- staffing pattern and the number of clinical staff

The hospital will need to have enough equipment and in the right balance to be able to efficiently use the time of both the ophthalmologists and the support staff.

Recognizing the role of the influencing factors described above, this manual briefly touches upon preferred clinical protocols for various procedures and lists the equipment required to perform them. The manual includes equipment in a model secondary hospital for an assumed workload and also gives a listing of equipment manufacturers. The purpose of this Manual on Equipping a Secondary Hospital is to throw light on the above to help hospital administrators and funding agencies understand the rationale that should be applied while planning for equipment and other resources.

R.D. Thulasiraj

Executive Director,

LAICO - Aravind Eye Care System

Acknowledgement

We deeply appreciate the support given by VISION 2020 - The Right to Sight – India, in contributing to the cost of developing the manual and more importantly reviewing the manual. We are extremely thankful to Dr. Rajesh Noah, the Executive Director of VISION - 2020 The Right to Sight – India for organizing and coordinating the review process. We are indebted to the members of the review panel Dr. Lalit Verma-AIOS, Dr. Sara Varghese - CBM, Dr. Taraprasad Das-LVPEI, Dr. G.V.Rao-ORBIS, Dr. Cherian Varghese-WHO for their painstaking efforts to give a very detailed feedback. We acknowledge Dr. Ismael Cordero of ORBIS International for the section on procurement management. This manual was developed over a period of time, and several people contributed, while we acknowledge the inputs of everyone. We would particularly thank Faculty members of Aravind Eye Hospital - Dr. Prajna, Dr. R.D. Ravindran, Mr. S.P. Venkatesh, Ms. Deepa and the DTP team for their contribution.

CONTENTS

CHAPTER I

INTRODUCTION

I. Magnitude of global blindness

Every 5 seconds a person in our world goes blind . . .

. . . and a child goes blind every minute.

Worldwide it is estimated that 180 million people are visually disabled. Of these, 37 million people are blind and this number increases by 1 to 2 million every year. Cataract contributes to 47% of blindness world wide, trachoma 4%, onchocerciasis 1%, and other diseases including glaucoma and diabetic retinopathy together contribute to 48%. Global blindness is expected to touch 75 million by the year 2020 unless special efforts are made to curb this trend of increasing blindness. In order to make a concerted worldwide effort to curb this trend throughout the world, the World Health Organization and a Task Force of International NGOs have jointly launched a common agenda for global action*: "VISION 2020 — The Right to Sight". VISION 2020 is a global initiative launched as a collaborative movement by WHO (representing Governments) and IAPB (representing INGOs).

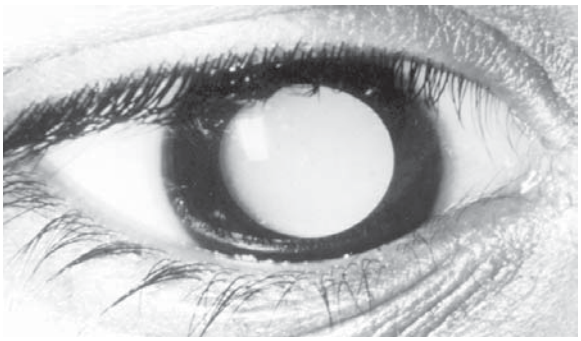
From among the many causes of avoidable blindness, at a global level five conditions have been identified as immediate priorities within the framework of VISION 2020. The priorities are based on the burden of blindness they represent and the feasibility and affordability of interventions to prevent and treat them. The five conditions are:

1. Cataract
2. Trachoma
3. Onchocerciasis
4. Childhood Blindness
5. Refractive Errors with specific emphasis on low vision

Other disorders, such as glaucoma, diabetic retinopathy and corneal diseases, at present, do not meet these criteria.

II. Blindness in India

India has the largest number of blind people in the World. Today's estimated figures show the blind population in India to be 12 million. Cataract accounts for 62.6% of blindness in India, the



Source :

* *Global initiative for elimination of avoidable blindness - Action plan 2006-2011, VISION 2020*

other major causes being refractive errors (19.7%), glaucoma (5.8%) and corneal pathologies (0.9%)*.

The blind population in India is estimated to rise to 15 million by the year 2020.

However, in India since trachoma is limited to certain geographic pockets and onchocerciasis is non-existent, glaucoma, diabetic retinopathy and corneal diseases form priorities under India's VISION 2020 action plan.

The goal of eliminating such avoidable blindness will be achieved through the following broad strategies:

1. Disease prevention and control
2. Training of required personnel
3. Infrastructure development and strengthening the existing eye care infrastructure
4. Development of appropriate and affordable technology
5. Advocacy and mobilization of resource

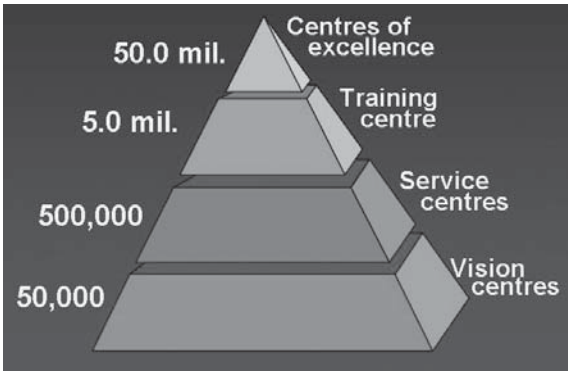
III. Combating blindness

Strengthening of infrastructure, human resource and standards is required at all levels of eye care delivery - primary, secondary and tertiary. Standard systems and protocols need to be instituted. Resource mapping is needed to determine the need for strengthening, expansion or building new facilities.

Before continuing, one should know the role and relevance of the various levels of eye care - primary, secondary, and tertiary.

a. Primary eye care

Community eye care and universal coverage can only be ensured through community based eye care services. The emphasis should be on preventive and promotive strategies, case finding and referral rather than solely depending on hospital based curative services. Primary eye care



can create better access to eye health services. Thus to provide meaningful and needs based services, primary eye care needs to become an integral component of primary health care.

The essential features of primary eye care include:

1. Delivery of basic eye care services to all individuals who are at risk of developing blindness or suffering from low vision, irrespective of their ability to pay for such services. This includes preventive care, refractive services, treatment of simple eye conditions, screening and referral for secondary care
2. Certain initiatives of social development that promote eye health through changes in behaviour, environment, adequate food, safe water supply and adequate sewage disposal
3. Provision of essential drugs for eye problems
4. Establishing linkages to referral systems to support primary eye care centres

Due to the enormous expense involved in setting up a tertiary care centre and the population base required to support it, not many can be set up. Primary eye care can be integrated with primary health centres.

b. Secondary eye care

Secondary eye care services refer to providing a mix of preventive, curative and rehabilitative eye

Source :

* *VISION 2020 The Right to Sight - Plan of Action NPCB, India Ophthalmology / Blindness Control Section, Govt. of India*

care interventions with a greater focus on curative services as to bring about a significant reduction in blindness and ocular morbidity in the service area. Since most of the blindness can be prevented or treated with secondary level interventions, it is important that this level remains most cost effective.

c. Tertiary eye care

Tertiary eye care provides the complete spectrum of sub-speciality eye care services and has the expertise to handle complicated cases. Tertiary health centres also play a vital role in training, deployment and professional updating of all categories of eye care personnel.

CHAPTER – II

SECONDARY EYE CARE HOSPITAL

I. Introduction

A secondary eye care centre bridges the gap between the primary and tertiary eye care services by providing eye care services ranging from treatment of small ailments related to external eye problems to speciality cases like cataract, refractive errors, corneal disease, glaucoma, paediatric eye problems and retinal disorders etc.

These hospitals provide diagnostic and curative eye-care services along with supervision of primary eye-care centres and referral to tertiary eye hospitals. The scope of activities of a secondary eye-care hospital can be categorized as:

a. Providing diagnostic and curative services for conditions such as:
   - Refractive errors
   - Cataract
   - Glaucoma
   - Trachoma
   - Trauma
   - Lacrimal surgery
   - Medical Strabismus

b. Diagnose and refer the following conditions to a tertiary eye hospital:
   - Surgical Strabismus
   - Disorders of the retina & vitreous
   - Conditions in children requiring advanced management

c. Other organizational activities:
   - Supervise and co-ordinate primary eye-care centres
   - Arrange for the referral of complicated eye problems
   - Provide continuous medical education with professional development to in-house staff

II. Workload estimation and infrastructure

Typically secondary eye hospital cover a population of 1-5 million depending on country setting and resource availablity. The infrastructure and equipment required for a secondary eye hospital should be decided based on the expected daily workload of the hospital. For the purpose of this manual, we have assumed the following workload:

Work Load	Estimation
Number of beds	40
Effective working days in a year	300
Number of surgeries per year	6000
Number of outpatients per year	60,000
Number of surgeries per day	20
Number of outpatients per day	200

For the infrastructure to be optimally utilised, the outpatient load and surgical load must be maintained.

III. Human resources

The efficiency of a hospital revolves around the ophthalmologist. It is necessary to ensure that an ophthalmologist is always available in the eye hospital. This would mean that, in addition to the regular ophthalmologist, there should also be junior ophthalmologist to share the workload and cover when the senior is unavailable. The whole clinical workload can be more efficiently handled with four doctors working full time, with two of them being senior and two being junior ophthalmologists. However this would work only if there is an adequate patient load to justify the employment of 3 - 4 doctors and to ensure job satisfaction. This means that there must be an outpatient load of at

least 200 patients and an average of about 20 operations a day.

The main activities of the rural eye hospital would be:

1. Out-patient care
2. In-patient care
3. Surgery
4. Community outreach work - eye camps and health education
5. Some training
6. Administrative work

The area required for a secondary eye hospital for the patient load indicated is as below:

Department	Details	Space Required
Outpatient Department (including Medical Records, Optical & Medical shop)	200 patients per day	3,750 sq. ft.
Theatre Area	20 – 25 Surgeries per day	2,250 sq. ft.
Wards	40 beds	4,000 sq. ft.
Office Area		1,000 sq. ft.
Total Area		**12,000 sq. ft.**

For this space to be optimally utilised, the outpatient load and surgical load must be maintained.

An estimation of the manpower required for all the basic activities is shown in the following table along with a brief job description.

Clinical personnel

Position	Number	Function	
Senior Ophthalmologist	1	Out patient examination, surgeries, ward rounds and adminstrative work	
Junior Ophthalmologist	2	Outreach screening, assisting the senior doctor in OP&OT	
Outpatient nurses	5	Preliminary vision screening	1 Nurse
		Tension, duct, assisting doctors	2 Nurses
		Refraction	2 Nurses
Ward nurses	4	Paying ward	1 Nurse
		Free ward	1 Nurse
		Night duty	2 Nurses
Theatre nurses	6	Scrub nurse	2 Nurses
		Running nurse	2 Nurse
		Sterilization nurse	1 Nurse
		Theatre assistant	1 Nurse
TOTAL	**18**		

Management personnel

Position	Number	Function
Administrator	1	Patient flow management, coordinating the different departments, performance monitoring, HR Functions accounting and public relations
Eye Camp Coordinator	1	Attracting sponsors, networking with the community, publicity for camps and organising eye camps
Administrative support staff	3	To handle registration, counselling, admissions, medical records, cash and book- keeping
Enquiry	1	Answering patient queries (optional)
House-Keeper	1	In-charge of supervising the cleaners, interior decoration, general maintenance
Cleaners	4	Responsible for the hygiene and cleanliness of the hospital
Security Staff	3	Responsible for the security of the hospital, and guiding patients in the right direction
Driver	1	Responsible for the vehicle and maintenance; should also be of assistance at the camp site
TOTAL	**15**	

IV. Instruments and equipment

A set of basic instruments and equipment are required for outpatient work, the laboratory and in the operation theatre. It is important to note that a certain minimal patient load is required for optimum utilisation of the equipment. The equipment purchased for the secondary eye care centre should be of a good brand and of high quality which in turn reduces the maintenance cost and loss of revenue due to downtime.

CHAPTER III

MEDICAL RECORDS

I. Introduction

The basic principles involved in maintaining a smoothly functioning medical records department are similar in all hospitals, regardless of size. Large teaching hospitals that support training programs for interns, residents and nurses usually find it necessary to elaborate on the basic records to fit their needs.

II. Systems and procedures

1. All medical records should be stored in a physically secure place under the control and supervision of the department in-charge
2. Entry to the medical record department should be restricted to the staff working in that department
3. The medical records should not be handled by the patient
4. No records should be removed without an authorized requisition
5. A serial numbering system should be used as the medical records number for outpatient patient records. The same number should be retained and used for surgical records if the patient is going for surgery. A separate inpatient number is not advised
6. Registration details should include the patients' full sociological details
7. The patients' records should be completely coded as per ICD 10 and can be continued till the new coding is released by WHO
8. The admission counter should function round the clock and is responsible for the admission of the patient, and for the maintenance of bed occupancy list
9. A consent form should be signed at the time of admission after the intervention has been clearly explained to the patient and the family member

Procedures

Step 1: Enquiry

1. Issue the information card to the patient/ attendee and assist them in filling it
2. Direct the patient to the new or review counter
3. Prepare the discharge list and cross check with the case sheet received at the end of the day
4. Analyse the follow up percentage

Step 2: New registration

1. Enter the patient information
2. Prepare the outpatient case sheet and ID card (to be given to the patient)
3. Collect the registration fee from the patients
4. Guide them to the OPD

Step 3: Review registration

1. Enter the patient information
2. Collect registration fee from the patients if required
3. Retrieve the record from the racks
4. Guide the patients to the OPD

Step 4: Coding

The outpatient and inpatient records are coded separately according to the diagnosis, treatment and surgical procedures accurately as per ICD-10.

Step 5: Filing

After coding the record, file the case sheet in the appropriate place according to the medical record number.

III. Instruments and equipment

S. No	Equipment	Dimensions	Number
1	Racks-(single and double cabin) four racks in a row with eight compartments	Height - 200cms Width - 100cms Depth - 35cms	Single Cabin Double Cabin - 3
2	Pigeon hole rack	Height - 26cms Width - 178cms Depth - 28ms	Five partitions in each compartment
3	Stationary cupboard	Height - 155cms Width - 75cms Depth - 40cms	One
4	Mobile step-ladder	Height - 65cms Width - 35cms Depth - 35cms	Six
5	Computer with printer and centralised processing unit with terminals		Computers – 2 Printers - 2
6.	Record baskets		5
7	Rubber stamps	With Date and Department	As required
8	Mike with amplifier		One (if required)
9	Working tables with chairs		Table - 2 Chairs – 5

CHAPTER - IV

OUTPATIENT DEPARTMENT

I. General OPD services

Introduction

The basic eye services covered in secondary model are refractive error correction, treatment of external eye diseases and cataract while other services depend on the competency and training of the ophthalmologist. Speciality service and external disease which need speciality advice will be referred to tertiary centres.

1. Systems and procedures

A patient in the OPD should be taken through the following stages:

Stage1: Preliminary vision

After the initial registration at the reception desk, irrespective of the ophthalmic pathologies, the visual acuity of all patients should be tested with Snellen Chart, illiterate E chart or Landolt's broken C chart. This can be done by a trained junior ophthalmic assistant.

Stage 2

A routine history taking and a basic ophthalmic examination including flash light examination, slit lamp examination and fundus examination with a direct ophthalmoscope or a 90 D lens (in cases with clear media) should be done by a junior ophthalmologist. This stage serves as a gateway to further tests. Depending on the findings elicited at this stage, further examination and investigations may be done.

Stage 3

All patients above the age of forty, coming for refractive error correction, should be subjected to a comprehensive eye examination, including IOP measurement and a detailed fundus examination after dilatation to screen for glaucoma and retinal problems.

It is recommended that all patients over the age of forty undergo a blood test and a BP check. If the patient is found to be diabetic or hypertensive, appropriate counselling and referral should be given.

At this stage, the patients, after having undergone all the appropriate indicated tests, are examined by a senior ophthalmologist for diagnosis and to plan treatment options.

Stage 4: Dilatation for fundus examination

1. All patients visiting ophthalmologist should have a dilated fundus examination. However for some patients with conditions like acute external ocular infections, narrow angle or closed angle glaucoma, dilated fundus examination may need to be deferred.
2. All patients should be dilated for fundus examination before posting for cataract surgery. This will also help to decide about phaco in patients with mature cataract.

Stage 5: Final examination and counselling

By the time the patient is brought to the medical officer, the patient has already been seen by the paramedics and tests have been completed. Before prescribing treatment, advising surgery or prescribing spectacles it is important for the medical officer to quickly review the case sheet and examine the patient to ensure that no vital details are missing. He / she must confirm all findings in the case sheet fully and check for any unexplained findings. If required, the entire history and clinical examination may be repeated.

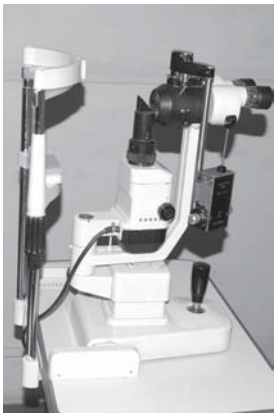
Counselling is possible only after the doctor reviews the case sheet. It is important to clearly and concisely explain to the patient the nature of his condition, treatment options, etc., In patients with hereditary disorders like retinitis pigmentosa and glaucoma, counselling is very important. Affected parents should be aware that their children are at risk, and should be advised to have their family members examined at the earliest possible.

All reference letters must be answered and a copy of the reply should be attached to the case sheet. While referring a patient to another hospital, the patient should be told why this is being done and given necessary guidance.

2. Instruments needed in outpatient department

Instruments	Quantity
Schiotz tonometer	2
Flashlight (battery/electric)	6
Slit lamp	2
Direct ophthalmoscope	3
Indirect ophthalmoscope	2
90 D lens	2
20 D lens	2
Gonioprism	1
Applanation tonometer head	1
Kimura spatula	1
No 15 surgical blade	1
Binocular microscope	1
Tangent screen (field test chart)	1
15 cm glass ruler	2
Weighing machine	1
Material for diplopia charting	1
Torch light with red and green glass	1
Slit light source	1
Red, green Goggles	1
Desirable equipment for High volume centres :	
HFA	
YAG LASER	

It is recommended that a functional ICU with the following equipment be established in case of standalone eye hospital.



ICU

1.	ECG Machine	1	Maestros
2.	Oxygen Cylinder	1	Sivaji
3.	B.P Apparatus	1	
4.	Stethoscope	1	Microtone
5.	Suction Apparatus	1	Gomco
6.	Nebulizer	1	Aerofamily
7.	Pulse Oxymeter	1	Nellcor
8.	Torch (cell)	1	Eveready

II. Refraction services

Introduction

Refractive error is one of the most common causes of visual impairment. As treatment of refractive error is perhaps the simplest and most effective form of eye care, a high incidence of vision impairment due to refractive errors in a population suggests that eye care services in that area are inadequate. In many parts of the world, refractive error is the second largest cause of treatable blindness, after cataract.

1. Systems and procedures

Mentioned below are the steps carried out in the refraction department:

a. History taking

Optometric history should include the following:

1. Chief complaint (common complaints are pain in the eye, blurred vision, headache, eye fatigue)
2. History of comfort with glasses, if used
3. History of comfort with glasses, if not used
4. Family history of ocular disorders (myopia, squint & blindness)
5. Occupation / nature of work – to recommend the appropriate lens design

b. Preliminary examination by using torch light

1. Ocular movements and deviation
2. Cornea: clear / hazy
3. Pupillary action and size - dilated / undilated
4. Lens: clear / hazy (cataract)
5. Any other opacities in the visual axis

c. Vision assessment

1. Done for finding out the existing vision
2. Assess both with and without glasses, monocular
3. Illiterate patients and preschool children may be tested with pictures / symbols. Vision testing to be done with fogging in patients with latent nystagmus charts (Matching tests)
4. For patients already wearing spectacles - specify the exact problem - Vision, nature of the frame, centering etc.,
5. Decide whether refractive correction is needed or not

d. Objective refraction (Retinoscopy)

1. Best way to assess the refractive error in children, illiterates and uncooperative patients
2. Make sure that the testing distance is properly maintained
3. Instruct the patient to look at a distant object
4. Consider the characteristics of the retinal reflex for quick and accurate retinoscopy
5. Preferable - Streak retinoscopy

e. Indications for auto-refraction

1. Almost all cooperative patients especially, patients with very high refractive power
2. Illiterate patients or children under cycloplegia
3. Patients who have come for the first time for refraction
4. All astigmatic patients
5. Handheld autokeratometer whenever indicated

Advantages

1. Quick, status of corneal curvature and degree of astigmatism can be acurate

f. Subjective refraction

1. This is done to prescribe comfortable binocular glasses. Subjective acceptance especially for cylinder may not be very accurate in children less than 6 years. It is better to rely on objective value
2. Trial lens-frame / Phoropter are used
3. Calculate the actual prescription from obtained retinoscopy value
4. Confirm the unaided vision first and add the power lens accordingly
5. Find out the vision improvement with sphere first to avoid unwanted cylinder power
6. Add the cylinder to correct remaining vision. Use of jackson cross cylinder measurment of PD
7. Accommodation BSV and steropsis should be measured in all cases especially in anisometropes
8. Vision testing - Binocularly with / without face turn in case of nystagmus

g. Near vision assessment

1. Ask the patient on his / her preferred reading / working distance and the demands of their profession
2. Must be done with distance lens correction
3. Allow a patient to read the chart first to decide the required power
4. If patient has a good reading speed, a weak correction may be needed
5. Determine the appropriate correction depending upon the visual needs
6. Ensure binocular comfort by allowing the patient to read the magazines/newspapers

h. Prescription writing

1. Suggest suitable lens design depending upon the patient's occupation and working conditions
2. Mention the vertex distance compared with the old glasses PD
3. Recommend only flat-top designs for constant bifocal wearers
4. Advice should be given on using plastic lens for children for safety reasons
5. Progressive lenses to the appropriate group of patients

i. Advice to the patients

1. Instruct the patients on using glasses for comfortable vision
2. Counsel the patient on the difficulties and limitations of lenses like slow adaptation and distortion
3. CL when indicated

2. Infrastructure

a. Refraction room

Ideally, a single or direct room (length: 6 meter / 20 feet) is to be used. In smaller clinics (especially in major cities) double throw room (length: 3 meter / 10 feet) can be used with a plane mirror and reversible chart.

b. Illumination of the consulting room

Any background illumination that falls on the screen will reduce the contrast of the symbol 5(or characters). While the examination can be conducted in a dark room, it is not comfortable for the patient and is not recommended by British Standards, which suggests that **the minimum background illumination must be equal to 10% that of the chart.**

3. Instruments needed for refraction

Instruments

1. Torch light (battery / electric)
2. Snellen test type (Snellen chart, illiterate E-Chart, Landolt's C Chart)
3. Trial lens set
4. Trial frame
5. Vision testing devices for children

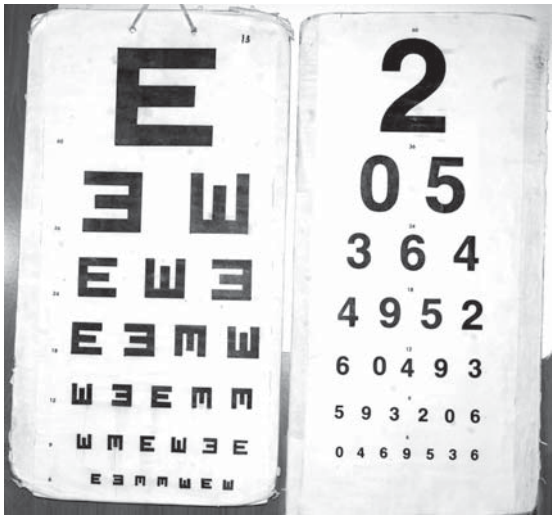
Retinoscope

6. Plane mirror retinoscope

7. Streak retinoscope
8. Tangent screen
9. Occluder
10. Jackson's cross cylinder
11. IPD ruler

Optional instruments

12. Auto refractor (optional)
13. Field test perimeter
14. Prism bar
15. Lensometer
16. Accommodative Ruler
17. Worth four lights - Near and Distance



CHAPTER V

STERILISATION

I. Introduction

Sterilisation and aseptic practices in the ophthalmic operation theater are aimed towards the prevention of postoperative infections and in cataract surgery it is endophthalmitis. The sterilization and aseptic measures that are followed have to address the preoperative patient preparation, washing and sterilisation of instruments, the operation theater environment and finally the theater personnel. Sterilization and disinfection are very important procedures which minimize the risk of transferring infection.

The intention of the chapter is to provide an overview of sterilisation in critical area and not to delve in details. We recommend the following books for detailed guidelines on sterilisation.

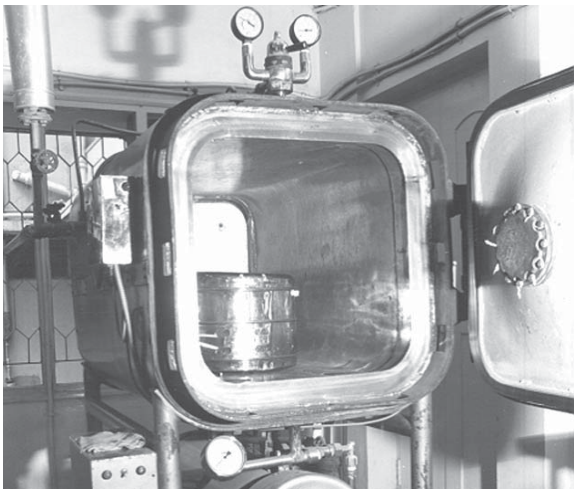
1. Sterilisation and Aseptic practices in an Ophthalmic Operation Theatre
   - By Dr. Lalitha Prajna, Dr. Annapurna Chavali, Aravind Eye Hospital, Madurai,
2. Ophthalmic Operating Theatre Practice: A Manual for Developing Countries
   - By Ingrid Cox, Sue Stevens, International Centre for Eye Health (ICEH), 2002
3. Operative Operation Theatre, A manual for Eye Operation Theatre, SEWA RURAL, Jhagadia, 2008

II. Sterilisation

Sterilization is the complete destruction of all pathogenic micro-organisms, ie: bacteria, viruses, fungi and spores. There are no half-way measures - make sure whether an item is sterile or not.

Sterilization is achieved only by

- Steam under pressure
- Dry heat



- Vapour
- Ionising irradiation

Autoclave is the most frequently used and the most effective method for sterilisation in operation theaters.

Disinfection

Disinfection destroys pathogenic micro-organisms, but does not destroy spores (unlike sterilisation).

Disinfection is achieved by

- Boiling
- Steaming
- Liquid chemicals.

Care of instruments

For effective sterilization to take place the instruments must be thoroughly cleaned before placing in the autoclave. The dried viscoelastics, blood etc must be thoroughly washed off.

Cleaning

- Special attention should be given to cleanse the surgical instruments before sterilisation.

Surgical instruments vary in configuration from plain surfaces, which respond to most types of cleansing, to complicated devices that contain box locks, blind holes and interstices

- Sharp and blunt instruments should be separated
- Instrument should be thoroughly cleansed by washing in sterile distilled water or mineral water
- An ultrasonic cleaner can be used for cleaning the instruments. It thoroughly cleanses every part of the instruments, including the depths of the cannula, tubes and other unreachable parts, with high frequency sound waves generating bubbles and vacuum zones. The tank of the cleaner should be filled above the level of the top of the instruments, suitable detergent as specified by the manufacturer is added. The temperature of water should be 80 to 110 degrees Fahrenheit and instruments should be kept in the ultrasonic cleaner for at least 30 minutes
- However, ultrasonic cleaners are not essential. One can use four bowl technique for the cleaning of the instruments as described below
- After removing the instruments from ultrasonic cleaner, the instruments are first brushed with a soft tooth brush
- Then washed in four basins containing mineral water or boiled water one after the other the first one contains mineral water with disinfectant. This should be done even if ultrasonic cleaner is not used
- They are then dried with clean towel; tipped with plastic sleeve and are segregated into separate sets. They are then packed in individual perforated stainless steel trays, which are placed in the bins with indicator and put in the autoclave. Three indicator tapes should be placed, one in the bottom, one in the middle and one at the top of the bin, of course one strip on the external surface of the bin is required to tell us whether the bin is sterile or not, even without opening the lid
- Cannulated instruments are first to be flushed with distilled water three times and then with air three times before autoclaving
- The bins/ packages must be properly labelled with the date, ward number etc.,

III. Advice on autoclaving

Water

Distilled or rain water can be used for flash autoclave, while tap water can be used for bigger free standing autoclaves.

Timing

Sterilisation time depends upon the steam pressure which is needed for the articles that are being sterilised:

Packing and loading of bins into the autoclave

Articles can be placed in metal sterilising drums with holes to allow for steam penetration. These articles should, ideally, be used within 24 hours of being sterilized.

It is important to put the lid of the autoclave correctly, as the steam must penetrate the drums or packets. Do not pack items too tightly, but allow

Articles	Steam pressure lb/in^2	Temp^0 C	Time /min
Drapes, linen, gowns	30	134	45
Soft goods and instruments	25	124	30
Rubber articles	10	116	40

space for the steam to penetrate, and the drying cycle to be completed.

Labelling

Put autoclave tape on to all packs indicating the date of sterilisation, who packed them, and their contents.

Drying

When the cycle is complete, contents are to be removed and placed on wire shelves to cool.

Storing

Once the items get cooled they can be wrapped in a polythene bag to prevent dust and external damage and stored in a dry place and preferably used within two days.

Testing autoclave effectiveness

- Chemical indicator – with every cycle, check for colour change
- Bowie –Dick test – once a week, see for colour change
- Biological indicator - Once a month – see for the colour change

Check list – autoclaving problems

1. Wet or damp articles maybe due to too tightly packing
2. Too little pressure, a faulty vacuum or over packing will cause incomplete sterilization
3. Autoclave register must be maintained with the name and signature of person who started the autoclave, time of starting and switching off the autoclave and if the indicator changed colour or not

Use of disinfection procedures

In an ophthalmic operation theater the use of disinfecting methods are very minimal and must only be used in situation where other methods are not available or suitable.

Boiling

Boiling achieves high level disinfection and kills bacteria, viruses. Spores are killed only after 4 hours of boiling. It is suitable for metal and some plastics.

Liquid chemicals (glutaraldehyde, chlorhexidine, etc.,)

- Manufacturers instruction must be noted when using chemicals
- Instruments may corrode over prolonged exposure
- After soaking, Instruments must be thoroughly rinsed in distilled water before use

Disinfection of outpatient department equipment

The common instruments that are used in the OPD consists of Tonometer, Applanation prisms tips, Slit lamps, Indirect ophthalmoscopy lens. As these are used for multiple patients these must be disinfected before use.

- Isopropyl alcohol 70% (Methylated spirit)
  - Gently wipe the surfaces with a cloth soaked in isopropyl alcohol and do not rinse but allow it to evaporate. This takes about a minute.
- Sodium Hypochlorite
  - This is readily available and very effective for bacteria, spores and viruses and can be used for OPD Instruments.

Human resources

Focus should be given on

- Allocation of staff for specific functions
- Clear definition of roles and responsibility of the staff
- Training and education: Delivery of service is not sustainable without a training component and continuing education
- Staff appraisals and assessment at different intervals

CHAPTER - VI

CATARACT SERVICES

I. Pre-operative procedures

1. Admission

The patient is admitted the day before the surgery, or four hours prior to surgery on the day of surgery (local patients, who had pre operative investigations earlier).

2. Investigations

Routine investigations

1. Intraocular pressure
2. Duct: If the duct is obstructed by mucus or pus, then a preliminary DCT/DCR must be done before cataract surgery
3. A-Scan
4. Keratometry
5. Blood pressure
6. Blood sugar

II. Surgical procedures

Manual SICS vs. Phaco

From an investment and recurring cost perspectives, manual SICS is more economical than phacoemulsification. It is as safe and the outcomes are nearly as effective as the latter. Manual SICS is of great relevance in large national or community blindness prevention programs to address cataract blindness and get the most out of limited financial resources. Phacoemulsification requires longer training involving a steeper learning curve. It also requires a higher surgical load to justify the high investment costs.

The rationale behind using phacoemulsificiation is the smaller size of the incision, which results in better immediate uncorrected visual acuity results. In order to take advantages of the smaller incision one needs to use (the more expensive) foldable IOLs. Phaco-emulsification can therefore, be chosen when there is significant demand from higher paying patients. However, since the investment is high, unless the hospital is able to generate a minimum volume of patients who can afford this procedure, it may prove to be counter productive in terms of income generation or opportunity costs.

The cost of the Phacoemulsification machine, its maintenance and replenishment of supplies, the high cost of foldable intraocular lens and the need for experienced surgeons have made manual SICS the technique of choice in many developing countries.

1. Preparing for surgery

Before the patient is taken into the OT ensure

- Topical antibiotics is instilled 3-4 times, starting the day prior to surgery. Peribulbar blocks are effective. If necessary, facial blocks can be supplemented
- The pupil is well dilated
- The eye is adequately soft with reduced intra ocular pressure
- The lid and surrounding areas have been cleansed with iodine
- The patients head is covered with a cap or towel
- The patients feet are clean
- Theatre gown has been provided (optional)

Then the patient is walked or wheeled into the OT

- Patients head must be positioned in line with the top edge of the operating table (a thin pillow or circular support can be used)

- The patient is covered with a clean sheet / drape up to the chin
- A chest guard (metal hoop that keeps the sheet off the patient's face and chest) is placed to allow easy breathing (optional)

2. Cleaning and draping

- Once again, clean the preoperative area from midline ear, brow to angle of the mouth with 10% povidone-iodine starting from the lids and working to the periphery
- The eye lid margins are painted with cotton soaked in iodoprep solution
- Instill a drop of half strength povidone-iodine into the conjunctival sac
- Drape the patient's head and trunk with sterile towels so that only the eye is exposed

3. The surgeon and the scrub nurse/surgical assistant must

- Wear face masks and caps
- Wash their hands and arms once with soap, then scrub twice with chlorhexidine / half strength povidone-iodine scrub lasting five minutes, then rinse thoroughly with boiled or autoclaved water
- Wear sterile operating gowns, well-covered at the back
- Wear sterile gloves and wash off the powder with sterile water

4. Operation theatre workflow

When the surgeon is operating on one table, the scrub nurse on the other table can prepare the next patient. The surgeon, on finishing the surgery should rinse his/her hands with antiseptic solutions and can proceed to the next surgery, by swinging the arm of the microscope over to the already prepared patient. This cuts down on the surgeons waiting time between surgeries.

While some people feel practising twin table system in operating room compromises sterility, there is no evidence to substantiate this. On the other hand the pay off is substantial in terms of enhanced productivity and this is critical since most hospitals operate with scarce resources. Where institutional policies don't allow this, the preparation could take place outside the operating room on an operating table which can be wheeled into the operating room. The principle is to minimize the waiting time between surgeries.

When the surgeon finishes a surgery, the scrub nurse on that table with the assistance of the running nurse can take over the remaining activities like bandaging the eye, getting the patient off the table, sending the used instruments for sterilization, etc. After finishing all the surgeries, some of the theatre staff should prepare the theatre and instruments for the next day's surgery. The others can be assigned to work in the OPD and wards. The theatre should have a sterilization room, patient preparation / recovery area, changing room, and a theatre stores attached to it.

III. Post-operative procedure

Discharge

1. The patient can be discharged around 3-4 hours after surgery
2. The first post operative examination and dressing should be done within 24 hours after surgery. During this time, the integrity of the wound, the corneal clarity and the presence of inflammation are checked. In addition, the following tests ought to be done
   - Vision with pin hole
   - Fundus examination

Post –operative counselling

On discharge the Patient is counselled on the following:

1. Compliance to prescribed medications
2. Follow the suggested precautions
3. Adherence to follow up scheduling
4. To report to the hospital immediately in case of severe pain, drop in vision etc.,

Follow up

The routine follow-up should be done as follows:

a. First follow up – After 7 - 10 days

1. Vision with pinhole, slit lamp examination, fundus examination with 90 D lens
2. If visual acuity is not good, the patient should be examined for Cystoid Macular Edema (CME) & started on NSAID drops

b. Second follow up - This follow up is highly recommended and can be scheduled as per the local protocol

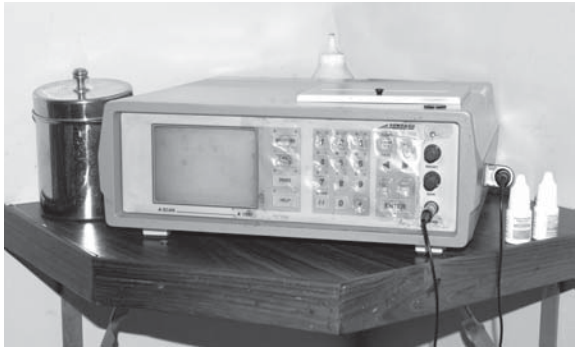
1. Refraction, slit lamp examination, fundus examination
2. Glass prescription if visual recovery has stabilized
3. If the best corrected visual acuity is not satisfactory and does not correlate with anterior segment clarity look for CME and if present, start NSAID drops
4. The patient is counselled to report to the hospital immediately in case of severe pain, drop in vision

Additional follow up examination can be scheduled in suture removalal cases.

Instruments required

For ocular examination

1. Snellen Chart
2. Flash light
3. Slit lamp
4. Direct ophthalmoscope
5. Indirect ophthalmoscope



6. 90D lens, 20D lens
7. Applanation tonometer
8. A Scan
9. Keratometer
10. Facilities for performing conjuctival swab culture (optional)

For general examination

(to rule out systemic illness and also to check for fitness in case of patients with systemic illnesses)

1. Stethoscope
2. Sphygmomanometer
3. Glucometer
4. ECG machine (optional)
5. X-ray facilities (optional)
6. Weighing scale

IV. OT equipment and microsurgical instruments

1. OT equipment

1. Operating Microscope with the following features:
   - Coaxial illumination
   - Good optics
   - Adjustable intensity of illumination
   - Range of magnification
   - Focus controls
   - Eye piece adjustment
   - Inter-pupillary distance adjustment
   - Adequate position adjustment
   - Sterile grips and knobs

2. Bipolar cautery
3. Anterior vitrectomy machine (optional)
4. Cryo machine (optional, rarely used now)
5. Pulse oximeter (optional)
6. Steam sterilizer, flash autoclave
7. Emergency light
8. Needle destroyer
9. Adaptors and extension wires

2. Microsurgical instruments

The microsurgical instruments for cataract surgery depend on the technique of the surgery and the surgeon's skill and preferred method in performing the technique.

The standard list of instruments used for cataract surgery is given below:

For cataract surgery (cataract surgical set), filtering surgery, pterygium excision

1. Universal eyelid speculum / Barraquer lid speculum
2. Fine toothed forceps, Hoskin's forceps
3. Heavy toothed forceps / muscle holding forceps / superior rectus forceps
4. Superior rectus needle holder (Arruga)
5. Curved round bodied needle
6. Mosquito clamp (anchor for bridle suture)
7. Spring scissors (Westcott) - tenotomy scissors
8. Bard Parker blade breaker and razor blades / Castroviejo blade breaker
9. Crescent blade, 15 Blade
10. 22 Gauge disposable needle with 120º bend
11. 2ml syringe for visco-elastic with a canula
12. 26 Gauge needle bent / cystitome
13. Corneal scissors
14. Mc Phersons forceps (capsule holding)
15. Vectis / lens loop / irrigating vectis
16. Lens spoon / squint hook (nucleus delivery)
17. Simcoe irrigation aspiration cannula & handle
18. 5cc syringe for manual aspiration
19. Lens holding forceps
20. Sinskey hook
21. Needle holder
22. Non-toothed forceps (for tying)
23. Vannas scissors
24. Straight scissors (optional)
25. Iris repositor, iris scissors, iris forceps (optional), Elshnig cyclo dialysis spatula
26. Kelly's punch, 26 guage needle (additional if trabeculectomy is to be performed with IOL surgery - combined procedure)
27. Artery clamp / Kalt needle holder
28. Phaco machine (phaco emulsifier)

Other supplies required

1. Silk (8-0), nylon (10-0), nylon (9-0), sutures - 5-0 silk/cotton bridle suture
2. Instrument trays (stainless steel tray with perforated bottom)
3. Trays for holding Cidex ®, OPA solutions and distilled water (stainless steel trays with non perforated bottom)

Other materials required

1. Surgical gloves size 6 to 8
2. Cotton gauze, cotton pad
3. Sterile wipers made from a cotton roll
4. Eye shield
5. Intraocular lens
6. Adhesive tape
7. Alcohol (hand wash between cases)
8. Dish for povidone-iodine ½ strength (for sterilization between cases)
9. Cotton tipped buds / triangular cellular sponges
10. Mannitol 20%
11. Ringer lactate / balanced salt solution / visco-elastics
12. 1/1000 adrenalin
13. IV set, IV stand
14. Emergency drug tray
15. Linen
16. Caps and masks
17. Sterile gowns

18. Theatre dress for patients (optional)
19. Sheets to drape over patients
20. Eye towel
21. Plastic drapes
22. Chest guard for asthmatics

Furniture required

1. 2 or 3 tables, dimension 6.6. 72" x 21" x 30", with head rest at surgeon's end
2. Surgeon's stool - adjustable elevation and cushion (with or without) back support
3. Footstool - to help patient mount the table
4. Instrument trolleys (stainless steel top is preferable) of adequate area
5. IV drip stand, with variable height adjustment

Instruments required for post operative care in the wards

1. Snellen chart
2. Torch light
3. Slit lamp
4. Direct ophthalmoscope
5. 90 D lens
6. BP Apparatus
7. Stethoscope
8. Steel bins
9. Toothed forceps

Other supplies like sterile cotton pads, cotton towels, wipers, gauze, and medicine tray are also needed in the wards.

V. Instruments and equipment (capacity–2 theatres)

1. Surgical equipment

Name	Quantity
Operating microscope	2
Bipolar coagulator	2
Vitrectomy machine	1

2. OT - General accessories

Name	Size	Quantity
Operation table	72" x 22"x 32"	4
Instrument trolley	26"x18"x32"	4
Revolving stool		3
Foot stool	24"x12"x12"	4
IV stand		3
Head rest		4
Chest rod		4
Patient stand		2
Pinky ball		2
Stretcher		1
Wheel chair		1

3. OT linen

Sl.No.	Name	Size	Colour	Quantity
1.*	Eye towels	46"x34" (centre eye hole Size = 2.5")	Green	40
			Light blue	40
2.*	Coat		Green	15
			Light blue	15
3.*	Table towels	41" x 34"	Green	25
			Light blue	25
4.*	Gown		Green	10
			Light blue	10
5.	Pant & shirt		Blue	25
6.	Cap & mask		Light blue	25
7.	Stretcher cloth	80" x 25"	White	6
8.	Bed sheet	85" x 56"	White	6
9.	Hand towel	21" x 14"	Blue	20

Note: * Green / Light blue - For use on alternative days.

4. Surgical instruments

Name	Quantity	Name	Quantity
Universal eye speculum	8	Vectis	8
Wire speculum	8	Corneal scissors	8
Superior rectus needle holder	8	Corneal needle holder	8
Superior rectus forceps	8	Tying forceps	8
Toothed forceps	8	Corneal forceps	8
Plain forceps	4	Cyclo dialysis spatula	4
Artery forceps	8	Caliper	4
Scleral forceps	8	Conjunctival needle holder	2
B.P. Handle	8	Iris forceps	4
Tenotomy scissors	8	Vannas scissors	4
Capsule forceps	8	Rhexis forceps	4
Mini blade holder sharpedge co.	16	Kuglen hook	2
15° Holder sharpedge company	8	Kelley's punch	1
Irrigating vertis	8	Blade breaker	8
Simcoe cannula	8	Scissors	4
Lens holding forceps	8	Chopper	2
Sinsky hook	8	Big artery clamp	6
Lens expresser	8		

5. OT vessels

Name	Quantity	Name	Quantity
Basin	4	Surgical tray	4
Saline cup with cover	14	Perforated tray	8
Water jug	2	Citelli forceps	1
Wiper jars	6	Urine can	1
Cryo bin	1		

CHAPTER - VII

SUB SPECIALITY BASED OPHTHALMIC CARE

I. Introduction

It is assumed that 15-20% of the patients attending the OPD at a secondary eye care centre will require subspeciality care. The secondary care centres should be equipped with basic subspeciality instruments and diagnostic equipment, with the ultimate goal of broadening these service areas as the organisations mature. For instance, laser units used for treating diabetic retinopathy were available only in tertiary care centres until a decade ago. Today, these facilities are a part of the services offered by secondary care centres. Suggested below are some subspeciality-oriented facilities which can be made available at a secondary eye care centre. Availability of these facilities will enable comprehensive, high quality, secondary eye care.

II. Corneal services

Corneal infections are commonly encountered in day-to-day practice. In a significant number of cases, it may often be impossible to arrive at an etiological diagnosis with the clinical presentation of the infection. In developing countries like India, fungi and bacteria cause corneal ulcers in almost equal proportions and hence empirical therapy may not be a very safe and effective idea. A basic ocular microbiological set up is an important prerequisite for corneal ulcer management in a secondary care centre.

1. Basic secondary eye care setting

The centre should have basic diagnostic equipment like a slit lamp, materials like fluorescein strips, rose bengal stains for staining procedures and Shirmers strips for assessment of tear film. These help in arriving at a correct diagnosis of the corneal lesion and rendering appropriate treatment.

The centre should be able to treat suppurative keratitis, corneal abrasions, corneal foreign bodies, pterygiums, corneal tears with or without iris prolapse, simple dry eye and other similar problems. Ophthalmologists should be trained to perform surgical procedures like pterygium excision, excision for suspected conjuctival, corneal lesions , and suturing of corneal tears.

Biopsy of excised specimen (e.g.,: for conjuctival epithelioma) can be done at the centre if histopathology examination (HPE) facilities are available or can be given to a pathology lab for HPE and further management can be done based on the result.

a. Instruments needed for treatment of corneal ulcer

1. Slit lamp
2. Kimura spatula
3. No. 15 surgical blade
4. Table binocular microscope

b. Other supplies required for treatment

1. Flourescein strips
2. Schirmers strips
3. 10% KOH, materials to perform gram stain
4. Cover slips, glass slides
5. Spirit lamp

III. Paediatric ophthalmology

1. Basic secondary eye care settings

In addition to the routine ophthalmic equipment like slit lamps and ophthalmoscopes, the following are required for providing paediatric services:

1. Sets of prism bars
2. Streak retinoscopes
3. Hess screen
4. Pulse air tonometer
5. Keratometer
6. Complete set of special vision assessment charts for children
7. All other minor accessory instruments necessary for strabismus evaluation which include Worth's Four Dot Test, RAF Ruler, Maddox Rod, Maddox Wing, Bagolini Glasses, Colour vision charts, test book for stereopisis (TNO book), Sheriden Gardiner Chart, Cambridge Crowding Cards (matching test), Keeler acuity cards (forced choice preferential looking charts), Cardiff acuity cards (vanishing optotype) apart from routine Snellen charts
8. Separate computer system

2. Surgical services

The operation theatre should be equipped for general anaesthesia and paediatric surgeries covering cataract, glaucoma, strabismus, traumas, lacrimal problems, lid and orbital problems. There should be separate pre-op and post-op rooms for children undergoing surgery.

IV. Glaucoma services

1. Basic secondary eye care setting

Essential aspects of clinical evaluation of glaucoma include: slit lamp bio-microscopy of anterior segment, intraocular pressure measurement, optic disc evaluation using direct ophthalmoscope, indirect ophthalmoscope or a slit lamp bio-microscope using a posterior pole lens (90D or 78D). All these should be carried out in the secondary ophthalmic centre.

Documentation of the optic nerve head changes in each visit can be done either by a hand drawn fundus diagram or a fundus picture (optional - can be done at the advanced centre).

The patient should be categorized according to the type of glaucoma - primary open angle (POAG), primary closed angle (PCAG), or secondary glaucoma. Target IOP should be determined for each case and medical management should be aimed at achieving the target IOP.

The centre should be able to administer, monitor and assess outcomes of medical treatment for all categories of glaucoma. The centre should be able to give emergency treatment for PACG and secondary glaucoma when indicated. Surgeries like trabeculectomy, trabeculectomy with PCIOL implantation, and glaucoma triple procedure can be carried out in appropriate and indicated cases.

Instruments needed for treatment:

1. Slitlamp bio-microscope
2. Gonio prisms
3. Schiotz tonometer
4. Applanation tonometer
5. 90D lens
6. Computerized visual field analyzer

2. Advanced secondary eye care setting

As the centre's patient load increases, availability of laser delivery system can facilitate doing YAG PI in indicated cases at the secondary ophthalmic care level.

Instrument required

1. Nd-YAG Laser unit attached with laser slit lamp adapter – for purpose of performing YAG PI and YAG capsulotomy.

3. Referral services

Juvenile glaucoma patients and patients with buphthalmos can be referred to higher centres for appropriate treatment. Other cases not responding to conventional medication and surgery should also be referred to a higher centre for alternative procedures.

POAG patients can be referred to a higher centre for advanced tests like automated field

analysis, optic nerve head and retinal measurements for more definitive diagnosis. Further follow up treatments as suggested, can then be continued at the secondary centre itself.

V. Orbit and oculoplasty

The centre should be able to render medical treatment for inflammatory and infective conditions with the administration of analgesics, anti inflammatory drugs and antibiotics. The administration of medication can be topical, or systemic (oral, IV, IM routes) depending on the severity of the case.

In indicated cases, surgical procedures like dacrocystectomy (DCT), dacrocystorhinostomy (DCR), simple tarsorraphy, chalazion incision and curettage, lid abcess incision and drainage, enucleation, eviceration, entropion and ectropion can be done at the hospital itself. The surgical sets for the above procedures should be available. Cases requiring correction for entropion, ectropion, ptosis and those requiring artificial eye fitting, ultra sound B scan (USG B Scan), cases of orbital fracture, and tumors can be referred to higher centers.

VI. Retinal services

A routine indirect ophthalmoscopy and a 90D fundus examination are mandatory tests to be performed at the centre itself. Documentation of findings by appropriate colour coding helps to estimate the progress of the disease in follow up visits. Over a period of time, fundus cameras can be added to the facilities available.

1. Basic secondary eye care setting

Medical retinal pathologies like diabetic retinopathy, vascular occlusions, central serous retinopathy etc. can be well documented and managed at the centre itself.

Instruments needed for treatment

1. Direct ophthalmoscope
2. Indirect ophthalmoscope with scleral depressor
3. Slit Lamp bio-microscope
4. 90 D Lens
5. 20 D lens

2. Advanced secondary eye care setting

Fundus fluorescein angiography and lasers used for retinal photocoagulation, are important requisites for advanced secondary level service delivery. Availability of lasers and their delivery system for pan retinal photocoagulation and focal photocoagulation will prevent unnecessary referrals to higher centres.

Additional Instruments needed in an advanced level set up:

1. Fundus camera
2. Laser unit for retinal photocoagulation with slit lamp laser adapter and/or indirect ophthalmoscope adapted for laser delivery (laser indirect ophthalmoscope)

3. Referral services

All cases needing surgical management like a retinal detachment can be promptly referred to a tertiary care centre. For cases which are referred for initial advanced treatment, follow up can be done at the secondary centre, and upon requirement of any further advanced treatment or progression of disease, can be again referred to the tertiary centre. If this is done, the patient will benefit from not having to spend money on long distance travel, and the centre will also gain clinical experience.

VII. Uveitis services

All basic diagnostic procedures, like performing a slit lamp examination, an examination with 90D lens, and an indirect ophthalmoscope examination can done and details should be documented in the case record of the patient.

Basic lab tests for determining blood total count (TC), differential count (DC) and erythrocyte sedimentation rate (ESR), skin test like mantoux, other specific tests like VDRL should ideally be available in the centre or in a lab which can be easily accessed.

These tests will help to arrive at an etiology for the manifestation and aid in rendering appropriate management for that patient. The treatment can be modified or upgraded, depending on the response observed in each follow up visit.

Instruments needed for work-up:

- Slit Lamp biomicroscope
- 90 D lens
- Indirect ophthalmoscope
- 20 D lens
- Basic lab instruments
- Cell counter
- Table microscope
- Glucometer

Referral services

Cases which need USG B SCAN, sophisticated tests for diagnosis, and immunosuppressive medication can be referred to higher centre.

VIII. Neuro-ophthalmic services

Single nerve palsies caused by underlying medical conditions like diabetes mellitus, or hypertension can be treated symptomatically, if radiological and imaging support facilities are available. If not, then these patients can be referred to places, where such facilities can be accessed. Base line details regarding diplopia can be recorded using Hess chart and diplopia charting.

During the follow up visit, this will aid in looking for improvement of the pathology following treatment.

Instruments required

Tangent screen	Automated field analyzer is optional
Hess chart screen	B.P Apparatus
Stethoscope	Glucometer
Supplies required	Torch with light source as a slit
Red green goggles	Colour vision charts

Referral services

Cases which require CT scan and advanced neurological evaluation and young patients with neuro-ophthalmologic manifestation can be referred to higher centres.

CHAPTER – VIII

SUPPORT SERVICES

I. Housekeeping services

Introduction

Housekeeping is one of the basic functions essential for the operation of a health care institution. It is housekeeping's responsibility to maintain an environment that is

- Safe and provides maximum bacteriological control throughout the hospital
- Pleasant with furnishings whose design and colour are pleasing to the patients and conducive to their recovery
- Functional, with everything necessary for the patient's recovery properly maintained and conveniently arranged.

Responsibilities of the housekeeping department

a. Environmental sanitation areas

1. Public areas such as lobbies and reception areas, canteens
2. Circulating spaces such as halls, elevators, stairways
3. Patient accommodation
4. Operating theatre(s), outpatient treatment rooms, laboratory
5. Toilets
6. Service and supply rooms

b. Environmental sanitation procedures

1. Window washing
2. Wall washing
3. Floor care (including rug and carpet cleaning, where necessary)
4. Furniture dusting, washing and polishing, upholstery cleaning
5. Light fixture cleaning
6. Rubbish removal
7. Disinfections
8. Ensuring clean linen

c. Noise control

1. Reduction of noise made by large equipment
2. Soundproofing of housekeeping and maintenance equipment

d. Interior decoration

1. Furniture repair and refinishing
2. Replacement of furniture and furbishing
3. Drapery making and/or repair
4. Ensuring attractive surroundings (paintings, flowers, etc)

Cleaning

The cleaning of windows, doors, walls, etc., helps in arresting deterioration and preserving appearances.

Preservation: With the help of protective coatings of paints, varnishes, waxing of floors, etc., the building and its furnishings can be preserved.

Replacement and repair

This involves timely repairs or replacement of sanitation equipment, water supply, electrical fittings, etc.

Hospital waste management

- Hospital waste contains biological materials, which possess potentially harmful microorganisms; special care should be taken while managing it
- Waste management should conform to legal requirements, Government norms and be acceptable to the general public

- Care should be given in segregation, transport, temporary storage and final disposal of hospital waste
- Segregation should take place at the source of generation of waste. It is very important that different colour code is followed and maintained throughout the hospital
- Non infectious items can be collected in black bags
- Infectious items – sharps, plastic items, human anatomical waste can be collected in blue, red and yellow bags respectively
- Non infective wastes are disposed in a landfill
- Infected solid wastes and human anatomical wastes (contents of yellow bags) are incinerated

II. Dietary services

Introduction

Dietary services are important in a hospital that provides inpatient care. Nutritious and appetizing meals help ensure patient satisfaction and aid the healing process. Service is usually provided in-house, but may be contracted to a responsible caterer. Meal service will be determined by local customs, hospital routines and procedures, and patient preferences. Nonpaying patients can receive free or low cost meals. Paying patients may expect meals to be included in their surgery and accommodation fee.

Attributes of effective dietary services

1. Meals should be available within hospital premises. Many patients will expect room service
2. Food must be of high quality. Patients with special diets, such as diabetics, must be served appropriate meals
3. The capacity of dietary services should match the expected volume of patients. In a growing eye care program, this might mean expanding or renovating the kitchen space, purchasing more cooking equipment, and hiring more staff
4. Staff must be well trained and knowledgeable about nutrition and special diets. They should understand the connection between dietary services, patient satisfaction, large volume and low cost
5. Patient attendees can bring revenue to the hospital, where appropriate, through their business to the canteen or coffee shop

III. Clinical laboratory

Basic lab equipment

1. Table microscope - 1
2. Cell counter - 1
3. Glucometer - 1
4. Chemical balance - 1
5. Calorimeter - 1
6. Other minor equipment (Test tubes, stand, etc.,)

IV. Stores (Materials management)

Introduction

Materials management means keeping track of all the hospital's supplies. It is the analysis, planning, implementation and control of carefully developed systems and programmes designed to achieve maximum cost efficiencies in the variable cost areas of supplies, equipment, services and personnel, consistent with organisational objectives. Materials management includes all aspects of purchase or procurement, inventory management, and issue and usage. It might include vendor negotiations, routine purchasing after sources have been established, demand forecasting, budgeting for supplies, maintenance/ disposal / recycling of supplies, receipt inspection and payment, stocking and storage, inventory control and loss prevention to minimize loss due to spoilage or pilferage.

Importance of stores

Efficient storekeeping helps to keep productivity high. Materials management is one of the key factors for improving performance of any department. Higher inventories mean higher (avoidable) costs, and they block scarce funds that might be required by the organization for operations or essential development.

Role of stores

The tasks of the storekeeper range from the safe custody and preservation of the material stocked, to the receipts and accounting, and to the issuing of supplies. The storekeeper's tasks are:

1. To maintain the continuity of supply by ensuring that all the materials are available at the needed time at an optimum cost
2. To facilitate the hospital operation by providing high quality goods
3. To reduce the operating cost
4. To decide whether to make something or buy it
5. To exercise control over the usage of goods

Principles of storekeeping

Supplies can be categorized under three headings: vital, essential and desirable. These three categories will determine how much of each item should be in stock at any given time. There are seven principles of material management that must be kept in mind to ensure good results.

The storekeeper in charge must follow these principles (the 7 R's).

1. Right time
2. Right quantity
3. Right price
4. Right source
5. Right delivery
6. Right methods
7. Right people

Models and systems of storekeeping

Stores departments can be centralized or decentralized. A centralized material management network focuses on the supplies needed for each activity or function of the entire hospital. A decentralized material management model is one where each area or department performs the various material management functions itself.

V. Medical equipment maintenance services

Introduction

The appropriate and safe operation of medical equipment is important to the proper functioning of any health care facility. A Medical Equipment Maintenance Department (also called medical instrument maintenance department, biomedical engineering department or clinical engineering department, etc.) is responsible for testing, repairing, and maintaining the hospital's diagnostic and therapeutic equipment.

In smaller hospitals, the role of medical equipment maintenance may be incorporated into the facilities maintenance department. Small hospitals that are part of a larger hospital system may also receive their medical equipment maintenance services from the medical equipment maintenance department of the central tertiary hospital of the system.

Role of medical equipment maintenance department

The major functions of this service are:

- Perform incoming inspection, installation, preventive and corrective maintenance, and special request service on clinical equipment owned, and/or used within the health system in compliance with regulatory agencies
- Minimize downtime of medical equipment by providing efficient follow-up on equipment problems

- Assist the materials management department and other departments with pre-purchase evaluations of new technology and equipment
- Assist clinical departments with service contract analysis, negotiations and management
- Provide coordination of clinical equipment installations including, planning, scheduling, and overseeing
- Training of clinical staff on operation and care of equipment
- Maintain equipment service records in an asset management filing system or database
- Assure patient and employee safety related to medical devices and systems

In smaller hospitals, some of the suggested roles presented may be taken on by the Materials Management Department or other departments.

Required facilities and equipment

Some important physical assets needed for this department:

1. A work space that can accommodate the equipment technicians and the materials that follow
2. Repair tools
3. Test equipment
4. Workbenches, stools, shelves and other furniture
5. Work lights
6. Essential spare parts
7. Library of operation and service manuals
8. Electrical outlets
9. Running water
10. This department should have access to a computer in the hospital for electronic storing of equipment inventory and repair records

CHAPTER - IX

OPTICAL AND PHARMACY SERVICES

Introduction

The optical shop and pharmacy are among the most important supporting departments in an eye hospital. Both can contribute to a high quality, and sustainable eye care program. To control the quality of spectacles and medications, both shops should be inside the hospital premises. Having them in-house also helps to keep the hospital running by generating additional revenues.

a. Attributes of an effective optical shop

1. Access to postal or courier services are necessary since prompt delivery is vital
2. If lens grinding occurs on site, the manufacturing area should be located near the optical shop for quick service
3. The optical shop should be treated like a retail business, with regular business hours, ample space for customer comfort, as well as friendly, helpful and knowledgeable staff
4. Quality must be monitored and maintained to ensure that patients receive the correct power in their glasses
5. A wide choice of glasses and frames should be available for purchase
6. All available frames should be hypoallergenic

b. Attributes of an effective pharmacy

1. The pharmacy should be open during extended business hours and available for emergency purchases as well
2. Stock should exceed expected demand so that shortages never occur. An experienced pharmacy supervisor should monitor purchasing and inventory to minimize loss due to spoilage. Bulk purchasing will help keep costs low
3. Quality must be maintained very carefully to avoid errors and to ensure patient satisfaction
4. All staff must be well trained, knowledgeable and courteous
5. The pharmacy should be situated for easy access to patients or their attendees

Efficient service will help ensure the hospital's productivity and reputation.

CHAPTER - X

COMMUNITY OUTREACH

I. Eye screening camp

Introduction

In developing countries eye care still remains to be a low priority considering other health care needs in the allocation of resources, besides the exisiting resources are not utilized to optimal level. Hospital services are not accessed by potential beneficiaries and the reasons being socio-economic problems, illiteracy and ignorance. The problems are similar in most of these countries. As an alternative strategy to increase access, the hospital should proactively go into the community and screen patient by organising outreach camps and health volunteers in villages should be trained to screen people for operatable cataract and motivate them to accept surgery.

In order to develop and maintain a high quality, large volume, sustainable eye care setup, it is essential to have this proactive approach of attracting patients instead of waiting for them to arrive on their own. *It is necessary to generate demand for the services of your institution through community outreach activities.*

The objectives of screening eye camps should be:

1. To identify people with cataract and offer surgery to restore their sight
2. To create awareness among the blind and motivate them to utilise the existing facilities
3. To detect other eye problems and advise / provide appropriate treatment (comprehensive eye care)
4. To prescribe and provide glasses for refractive errors (at affordable rates)
5. To detect and treat (referring for surgery when required) cases with diseases such as pterygium, chronic dacryocystitis and other infections
6. To identify and treat / refer school children in the villages with refractive errors, squint, amblyopia, nutritional deficiencies
7. To provide health education on proper eye care in the community
8. To develop and maintain a relationship between the institution and the community
9. To market eye care facilities and services offered
10. To provide a training ground for medical staff in order to develop their capacity

The various eye camps are:

1. Screening (diagnostic) camp
2. Outreach (mobile) surgery camp
3. School eye health screening programs
4. Community-based referral systems

1. Systems and Procedures for Conducting Community Outreach

a. Pre-camp activities

Activities	Time frame
Develop an annual plan and weekly/monthly schedule.	At the beginning of the year
Contact the sponsors and help them understand the need for camps.	At least one month before the camp
Judge the sponsor's financial capacity and manpower availability.	At the time of approach
Make sure the sponsors understand their commitment.	At the time of approach
Explain the camp procedure to the sponsor.	At the time of approach
Suggest a suitable date that does not coincide with local festivals, harvest, etc.,	One month prior
Select and confirm the camp site.	One month prior
Assist the sponsor in planning the work and the publicity strategies.	After finalizing the date and place
Update the sponsor on hospital based activities related to camps.	Periodically
Give the sponsor a standard format for notice bills and posters for publicity work.	One month before
Ensure the execution of publicity work (proper planning and delegation).	Two weeks before the camp
Conduct periodical meetings (monthly / weekly) at the base hospital to assess the number of doctors, paramedical staff, drivers and vehicles needed.	Once in a month
Plan the accommodation and food for the expected inpatients on the camp day.	During the camp meeting
Prepare the operation and discharge schedule.	During the camp meeting
Finalize the camp posting and inform the people concerned.	A week before the camp
Make sure the stores has been informed on all the materials required (medicines, printed forms, etc.,).	A week before the camp
Plan transportation for the patients from the campsite to the hospital and back.	A week before the camp

b. Camp day activities

Activities	Time frame
Make sure the OP & IP registers, other documents, medicines, equipment etc. are ready.	One day before the camp
Arrange furniture and facilities in the camp site for various stages in the screening of patients.	One day before the camp
Give the volunteers instructions on registering the patients and regulating the flow of patients.	One day before the camp
Counsel the patients advised for surgery.	On the camp day
Check the patient's BP and do urine tests at the camp site.	On the camp day
Enter the inpatients details in the relevant forms.	On the camp day
Arrange food for medical team as well as the patients selected for surgery.	One day before the camp
Arrange transport to take the patients to the hospital.	On the camp day

c. Post-camp activities

Activities	Time Frame
Admit the patients brought from the camp.	On the camp day
Inform the doctors and paramedical staff to take care of preoperative procedures.	A week before the camp (a temporary schedule)
Make food arrangements for the patients.	On the camp day
Supervision of the medication provided to the patient after surgery.	Daily
Inform the sponsor of the results of the camp and thank him for his cooperation.	Next day of camp
Maintain a good rapport with the sponsor.	Periodical visit, mailing and meeting
Discuss the success and failure; review the plan and performance.	Every week
Draw camp reports and statistics (update).	For each camp after discharge
Send the reports to the local agencies, government sectors, supporting agencies.	For each camp whenever it is needed
Get interdepartmental feedback to maintain the level of satisfaction and growth.	Periodical meeting
Plan future outreach programs	End / beginning of the year

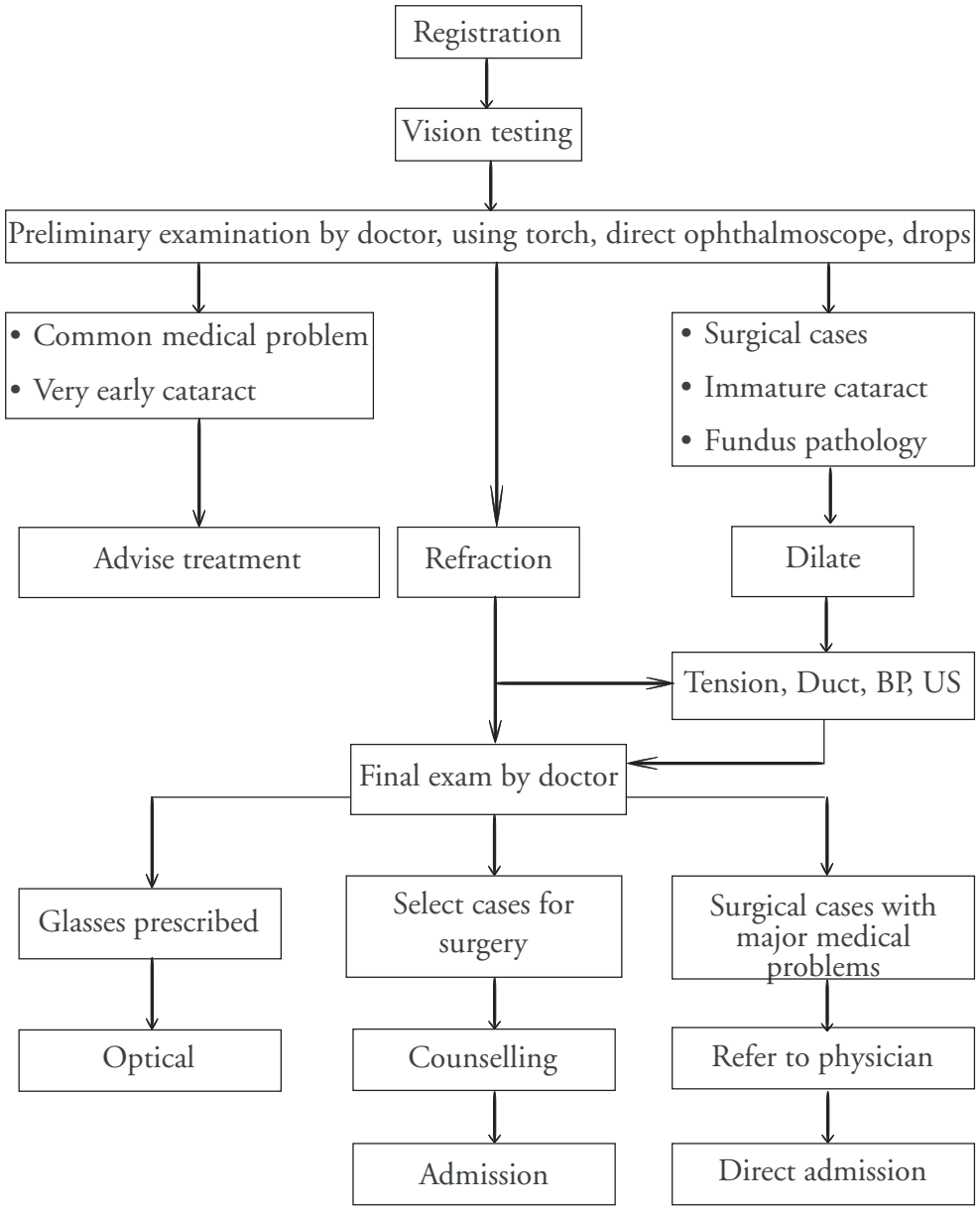
Flow of patients in a camp

The flow of patients in a camp should be managed so as to facilitate a comprehensive eye examination of all patients in a short time. This requires good coordination and cooperation among the staff members in the camp.

Station 1 - Patient registration

1. Volunteers record the patient's name, age and address in the case sheet
2. These volunteers must have legible handwriting (usually teachers)
3. Patients are given identity cards, which should be retained for future follow-up

Flow Chart of examination protocol at campsite



Stage 2 - Preliminary vision testing

1. Vision testing is conducted by ophthalmic assistants, aided by volunteers
2. Vision charts, such as the Snellen chart in the local language and illiterate E type charts, are used with adequate illumination

Stage 3 - Preliminary diagnostic examination

1. Junior ophthalmologists conduct the preliminary examination
2. They use flashlights (torches) and ophthalmoscopes to examine the external eye and fundus
3. They need a dimly lit room with desk, chairs, and two functioning electrical outlets
4. If there is no electricity, doctors use battery-operated instruments

Stage 4 - Intraocular pressure and tear duct function

1. This test is conducted by trained ophthalmic assistants, with the help of community volunteers

Station 5 – Refraction

1. Patients with complaints of defective vision due to refractive errors, myopia, presbyopia, outdated glasses, or aphakia are examined
2. Well-trained ophthalmic technicians refract while volunteers help control the patient flow
3. Mostly refraction is accomplished without dilation, but young children and some adults receive cycloplegia. There are adjoining waiting rooms for dilatation

Stage 6 - Final examination

Senior doctors evaluate the test findings and conduct the final examination, review the patient's record, make the final diagnoses and prescribe treatment. In a small camp, one doctor will do both the preliminary exam and the final exam. Senior doctors can prescribe glasses or medicine, or advise the patient to undergo surgery.

Stage 7 - Optical shop

1. This is managed by an optician who attends the screening camp
2. If the patient is advised glasses he or she can purchase readymade spectacles, if available

Stage 8 - Patient counselling and IP admission

1. Those patients scheduled for surgery are registered, counselled, and transported to the base hospital at the close of the eye camp
2. These patients receive surgery, post-operative care, meals, and round-trip transportation

2. Man power requirement for outreach activities

The manpower requirement in a camp depends on the size of the camp. Ideal man power utilization can be as in the table below:

Number of expected patients **Expected cataract operations**	**<200** **10-40**	**200-400** **40-80**	**400-600** **80-120**	**>600** **>120**
Ophthalmologists	1	2	3	5-7
Ophthalmic assistants:	(3)	(6)	(9)	(11-12)
- Preliminary vision	1	2	3	3-4
- IOP & duct	1	2	3	4
- Refraction	1	2	3	4
Optician	1	1	1	1
Camp organizer	1	1	1	2
Patient counsellor	1	1	1	1

3. Equipment needed for a screening eye camp

Number of expected patients Expected cataract operations	<200 10-40	200-400 40-80	400-600 80-120	>600 >120
Snellen chart	4	6	7	8
Tonometer	1	2	2	2
Ophthalmoscope	1	1	2	3
Flashlight (battery/electric)	2	2	4	4
Medicine tray	1	2	2	3
Basin	1	2	2	2
Cubicle set and cloth	1	2	3	4
Trial lens set	1	2	3	4
Retinoscopy mirror	1	2	3	4
Wire set with bulb & bulb holder	3	4	5	6
Extension switch board	1	1	1	2
Bulb	3	4	5	6
Jar / bin	1	1	1	1
Needle2	4	6	10	
Syringe	1	2	3	5
Kidney tray	1	1	1	1

II. Primary eye care centre

Screening eye camps, conducted with minimum infrastructure requirements, rely heavily upon reaching out efficiently to more people in rural areas and also encouraging active involvement of the community.

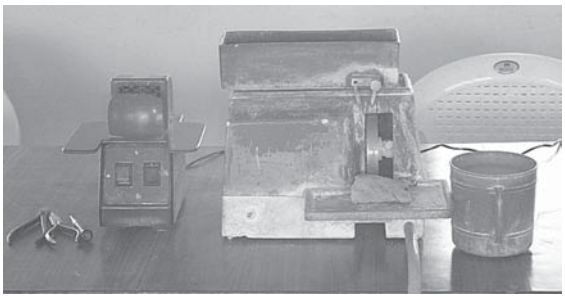
In spite of the enormous amount of work done through outreach camps, studies show only 7% of people who need eye care access these services.

Outreach camp is the short term strategy used in order to clear the backlog, to create awareness in the community and to create demand for the hospital. But in the long run a more sustainable solution is to establish permanent eye care facilities in the community in the form of vision centres which will provide primary eye care services and also act as a referring point channelling the patients to the secondary hospital for surgeries.

For running a vision centre, in other words primary eye care centre, with 2 mid level ophthalmic personnel, the following instruments and equipment are adequate.

Equipment needed for primary eye care centre

Slit lamp	1
Streak retinoscope	1
Direct ophthalmoscope	1



Trial sets	1
IPD scale	1
JCC	1
Mirror (refraction)	1
Snellen chart (drum)	1
Near vision chart	1
90 D lens	1
Applanation	1
Basic sterilizer	1
Low Vision	
Hand held magnifier	1
Optical dispensing	
Grinding, edging kit and machine	1

CHAPTER – XI

MANAGEMENT

Introduction

The administrator and his or her team must be responsible for all the non-medical activities. This will broadly comprise of getting adequate patient load through innovative social marketing approaches and ensuring that the clinical services are provided in a cost effective manner through optimum utilization of resources. The team will also need to manage functions such as medical records (a necessity in face of the growing malpractice suits), inventory, housekeeping, security and support services. Adequate area for administration and support services must be provided. In addition to routine administration of accounts, inventory, etc., the community outreach work will form a significant part of the administration.

1. Equipment

S.No	Particulars	Quantity
1	Computers	1
2	Printers	1
3	UPS	1
4	Server	1
5	LCD Projector	1
6	Furniture	To requirements

CHAPTER - XII

PROCUREMENT MANAGEMENT

General financial and management considerations for owning medical equipment

Medical equipment costs money to operate and to maintain during its life cycle. On average, the original purchase cost only constitutes about 20% of the entire life cycle costs of the equipment. Installation of certain equipment such as large sterilizers will involve initial additional costs for dedicated water and electrical supplies. Expensive consumables, which generally are not re-usable, are required for devices such as phaco and vitrectomy machines.

All medical devices, regardless of their complexity and ruggedness, require periodic maintenance and corrective maintenance at some point. Even a simple device such as an ophthalmoscope requires ongoing costs for replacement of bulbs and batteries, including rechargeable ones.

As a rule, equipment owners should budget anywhere from 3% to 7% of the purchase cost per year for each device to cover consumables, parts, maintenance, and user training. The life cycle of a medical device can range between 5 and 15 years, depending on the design and ruggedness of the device and the environment in which it is used. A plan must be in place to replace equipment.

All eye care departments and institutions should have a medical equipment management program to assure the maximum and most cost effective utilization of its technology. This equipment management program may, depending on the available resources and capacity of the institution, be handled by an in-house biomedical engineering department, by an outside service organization, or by an equipment maintenance service shared by several linked institutions. This program should include equipment inventory, preventive maintenance, corrective maintenance, emergency repair services, vendor and contract management, technology planning (including selection, procurement and retirement of equipment), training for equipment users and patient safety, among other functions.

General considerations for evaluating and procuring ophthalmic equipment

Equipment planning should be fully integrated into any plans for new construction or renovations to assure that the equipment will fit in the new space and that matters such as work flow, safety, and appropriate electrical, plumbing, cooling, and other utilities are available.

The suggestions below might prove beneficial when evaluating new equipment for purchase

- Consult other users of the same equipment and, if possible, of the very same brand and model. Ask the salesperson for the names of the hospitals and the physicians in those hospitals who are using his company's products. If there are no local users of this manufacturer's equipment, you may wish to consider other manufacturers with more customers in your area. (The company is more likely to be able to provide better service if it has several customers in the same area)
- Communicate with colleagues in major teaching centers that are likely to have the specific devices being considered
- Consult the major ophthalmology publications for articles containing objective evaluations of the particular equipment of interest
- Ask vendors to loan the hospital a unit to be tested by the hospital's staff

- Seek help from non-governmental organizations (NGOs) that might be in a position to obtain objective information from other practitioners abroad
- If possible, defer the purchase until a visit to a major equipment exhibition at a professional meeting or conference where other users can be consulted and comparison of the products of many different manufacturers can take place all in one setting

In addition to quality and performance of the devices, some additional important criteria that should be considered when evaluating equipment for purchase are:

- Total purchase price?
- Estimated ownership costs per year (supplies, spare parts, accessories)?
- Terms of payment?
- Installation costs?
- Delivery costs?
- Delivery time?
- Installation services provided?
- User and maintenance training provided?
- Operation manuals in local language included?
- Warranty period?
- Service costs per hour after warranty period?
- Post-warranty service contract available? If so, what is the cost per year?
- Factory trained service engineers available locally?
- Availability of spare parts and consumables locally
- Estimated time for service eng. to arrive on site for service?

It is advisable to get quotations or proposals from at least 3 different vendors, if possible. Once a vendor is selected, the hospital will need to prepare a purchase order (P.O.), which is a document clearly stating everything a hospital wishes to purchase from a particular vendor and it represents an agreement between the hospital and the vendor, on the terms of that purchase.

On some occasions, the vendor may present a standard purchase agreement for use as an example for the hospital's P.O. This document should be read carefully, & unless it includes all the provisions that are considered necessary, the vendor should revise it or the hospital should write its own P.O. This ensures that it includes all the provisions you wish and that can be jointly agreed upon.

The first and most important requirement is that the P.O. contains detailed pricing information. If the device being bought contains assemblies, hand pieces, foot switches or other accessories that are not included in the basic machine price, each item should be listed separately. Some other items that may be necessary to itemize in a P.O.:

- Warranty terms
- Payment arrangements
- Delivery terms
- Installation terms
- Manuals to be included
- Additional accessories
- Additional software
- Maintenance or service contracts beyond the warranty period
- Any wiring, plumbing or construction work that the seller or his contractor must perform in order to prepare the installation site
- Any other parts, assemblies or attachments for which you have negotiated
- Additional arrangements for training or in-service either on or off site

The important point to remember is that everything that is expected to be received should be shown on the P.O. to eliminate surprises or misunderstandings.

Offers of equipment donations by humanitarian agencies and NGOs should be critically evaluated with the same rigor, if not more, that is performed for purchases. This will eliminate the common problems associated with inappropriate donations such as obsolescence, lack of local service support, lack of manuals, lack of spare parts, etc.

ANNEXURE

I. INSTRUMENTS AND EQUIPMENT LIST

Introduction

Adequate and appropriate instruments available at an eye care centre help eye care personnel to arrive at a correct diagnosis, to render proper treatment, and thus provide comprehensive high quality eye care to its patients.

All supplies, instruments and equipment should be used efficiently and effectively. It is very important that all the instruments are kept in good working condition at all times and "down time" during which any instrument is not working is kept to a minimum.

The following is a comprehensive list of instruments required in a secondary care hospital. The total number calculated is based on the man power in the hospital and the distribution of man power everyday within the hospital.

Basic Secondary Eye Care Setting:

I. Instruments needed in OPD

a. Diagnostic equipments

1.	Schiotz tonometer	2
2.	Flashlight (battery/electric)	6
3.	Slit lamp	2
4.	Direct ophthalmoscope	3
5.	Indirect ophthalmoscope	2
6.	90 D lens	2
7.	20 D lens	2
8.	Gonioprism	1
9.	Applanation tonometer	1
10.	Kimura spatula	1
11.	No 15 Surgical Blade	1
12.	Binocular microscope	1
13.	Bjerum's screen (field test chart)	1
14.	Goldman perimeter (field test perimeter)	1 (optional)
15.	15 cm glass ruler	2
16.	Hess chart screen	1
17.	Weighing machine	1
18.	Material for diplopia charting	1
19.	Torch light with red and green	1
20.	Slit light source,	
21.	Red green goggles	1

b. Supplies needed for refraction

1.	Snellen test type (Trial drum or separate charts)	4
2.	Near vision testing (Jaeger chart or Snellen near vision test type)	4
3.	Retinoscope	
	a. *Plane mirror retinoscope*	1
	b. Streak retinoscope	1
4.	Trial frames (light, readily adaptable, allowing adjustment for each eye separately)	2
5.	Trial case	2
6.	Prism bar	1
7.	Refractometer	1
8.	A-scan	1
9.	Keratometer	1
10.	Occluder	1

Additional instruments to provide advanced secondary eye care

1.	Fundus camera	1
2.	Laser unit (YAG LASER) with slit lamp adapter	1
3.	Laser unit for retinal photocoagulation	1
4.	Exopthalmometer (optional)	1

II. OT equipment and microsurgical instruments

a. Instruments needed in block room

1. Balancing weight, pinky balls, kulvari stands 2
2. Oxygen cylinder and nasal cannula 1
3. Endo tracheal intubation tubes 1
4. Ambu bag 1
5. Laryngoscope 1
6. BP apparatus 1
7. Stethoscope 1

Other supplies:

1. Soap – liquid soap or bar soap
2. Surgical scrub
3. Emergency kit

b. Equipment required for OT

1. Two Microscope, with the followingfeatures
   - Coaxial illumination
   - Good optics
   - Adjustable intensity of illumination
   - Range of magnification
   - Focus controls; Eye piece adjustment
   - Interpupillary distance adjustment
   - Adequate position adjustment
   - Sterile grips and knobs
2. Bipolar cautery machine - 2
3. Automated vitrectomy machine if possible - 1
4. Cryo machine (optional, rarely used now)
5. Steriliser (flash autoclave) - 1
6. Boyle's apparatus
7. Suction machine

Microsurgical instruments

(For cataract surgery, filtering surgery, pterygium excision). The microsurgical instruments for cataract surgery depend on the technique of the surgery and the surgeon's skill and preferred method in performing the technique. The standard list of instruments used for cataract surgery is listed below.

a. Cataract surgical set

1. Universal eyelid speculum / Barraquer lid speculum
2. Fine toothed forceps, Hoskin's forceps
3. Heavy toothed forceps / muscle holding forceps / superior rectus forceps
4. Superior rectus needle holder (Arruga)
5. Curved round bodied needle
6. Mosquito clamp (anchor for bridle suture)
7. Spring scissors (Westcott)-tenotomy scissors
8. Bard Parker blade breaker and razor blades / Castroviejo blade breaker
9. Crescent blade, 15 Blade
10. 22 gauge disposable needle with 120º bend
11. 2ml syringe for viscoelastic with a canula
12. 26 gauge needle bent/cystitome
13. Corneal scissors
14. Mc Phersons forceps (capsule holding)
15. Vectis/lens loop/irrigating Vectis
16. Lens spoon/squint hook (nucleus delivery)
17. Simcoe irrigation aspiration cannula and handle, and 5cc syringe for manual aspiration
18. Lens holding forceps
19. Sinskey hook
20. Needle holder
21. Nontoothed forceps (tying)
22. Vannas scissors
23. Straight scissors (optional)
24. Iris repositor, iris scissors, iris forceps (optional), Elshnig cyclo dialysis spatula
25. Kelly's punch, 26 Guage needle
26. Artery clamp/Kalt needle holder
27. Capsulorhexis forceps
28. Anterior capsulotomy scissors
29. Posterior capsule polisher cannula
30. Hydro cannula 25G
31. Towel clip

Other important supplies:

1. Instrument trays (stainless steel tray with perforated bottom)
2. Trays for holding cidex® OPA solutions and distilled water (stainless steel trays with non perforated bottom)
3. Silk (8-0), nylon (10-0), nylon (9-0) sutures, 5-0 silk/cotton bridle suture

b. For chalazion incision and curettage

1. Bard parker handle, 15 blade
2. Chalazion forceps/clamp (Lambert)
3. Chalazion curette (Meyerhoffer)
4. Toothed forceps

c. For dacryocystorhinostomy and dacryocystectomy

1. Bard parker handle, 11 blade
2. Curved small size artery clamp
3. Toothed forceps
4. Lang's lacrimal sac dissector/bone dissector
5. Cat paw retractor
6. Tenotomy / lacrimal sac cutting scissor
7. Castroviejo punctum dilator
8. Bowman naso lacrimal duct probe
9. Needle holder
10. Thudicum's nasal speculum
11. Tilley's nasal forceps
12. Meuller lacrimal sac retractor
13. Bone punch small and large (Citelli's or Ronguer forceps)
14. Suture materials:
    - 4-0 silk suture
    - 6-0 vicryl sutures

Optional

1. Probe set
2. Sac cannula
3. Pawar implant introducer
4. St. Tying forceps

d. For enucleation and evisceration

1. Universal eye speculum /PA speculum
2. Tenotomy scissors
3. Toothed forceps
4. BP handle, 11 blade
5. Evisceration spoon (Mule)
6. Enucleation spoon (Well's)
7. Muscle hook
8. Enucleation scissors
9. Needle holder
10. St. Tying forceps

III. Equipment needed for sterilisation

1.	Single drum electrical autoclave for sterilisation	1
2.	Stainless steel drum with electric coil with tight lid with tap	1
3.	Ultra sonic cleaner	1
4.	Flash autoclave-high speed steriliser	1
5.	Surgical drum (capacity to hold 6 sets)	2
6.	Separate drums for autoclaving linen from OT	1

IV. Basic lab equipment

1. Table microscope
2. Cell counter
3. Glucometer

V. Equipment needed for a screening eye camp

Equipment needed for a screening camp depend on the volume of patients to be seen in the camp.

An ideal list of supplies for a screening eye camp can be as in the following table:

Particulars	Camp size			
	Small	Medium	Large	Very Large
Number of expected patients	<200	200-400	400-600	>600
Expected cataract operations	10-40	40-80	80-120	>120
Snellenchart	4	6	7	8
Tonometer	1	2	2	2
Ophthalmoscope	1	1	2	3
Flashlight (battery/electric)	2	2	4	4
Medicine tray	1	2	2	3
Basin	1	2	2	2
Cubicle set and cloth	1	2	3	4
Trial lens set	1	2	3	4
Retinoscopy mirror	1	2	3	4
Wire set with bulb & bulb holder	3	4	5	6
Extension switch board	1	1	1	2
Bulb	3	4	5	6
Jar / bin	1	1	1	1
Needle	2	4	6	10
Syringe	1	2	3	5
Kidney tray	1	1	1	1

Optical dispensing equipment

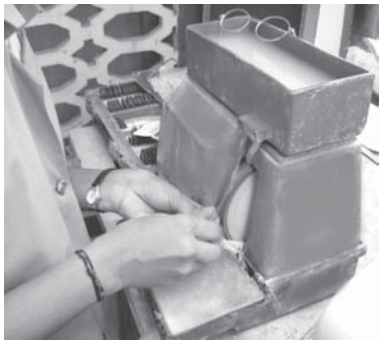
I. Manual Edging Sets
   1. Manual Edging Machine (Avanti Motor)
   2. Frame Warmer
   3. Screw Driver
      - Br.2mm
      - Br.1.50mm
      - Br.1.mm
   4. Marking Pencil
   5. Adjustment Pliers
   6. Nose pad Pliers
   7. Nose Pliers
   8. Chipping Pliers
   9. Diamond Cutter
   10. Axis Marking Chart
   11. All Screw Box Unit
   12. Machine Hose
   13. All Nose pads

II. Rimless & Supra Frames Grooving Machine
   1. Auto Grooving Machine (Supra Frames)
   2. Drilling Machine (Three Piece Frames)
   3. Nut Driver

III. Cleaning
   1. Acetone
   2. IPA
   3. Tissue Paper
   4. Selvet Cloth

IV. Power Checking
   1. Lensometer (Automatic Power checking Machine)
   2. Trial Set (manual Power checking)

V. Automated Fitting Sets
   1. Kappa Edger
   2. Kappa tracer
   3. Lens Tracer
   4. Adhesive Pads
   5. Pluger
   6. Bar Coding Sheet



Manual Edger

Auto Edger

Lensometer

II. OPHTHALMIC INSTRUMENTS AND EQUIPMENT MANUFACTURERS LIST - GLOBAL

No	Manufacturer	Address	Website	Products
1	2010 Perfect Vision	Am Taubenfeld 21/1 Heidelberg (Germany) D-69123	www.2010pv.com	Laser: Refractive Cornea Surgery, VISX, LASIK, PRK
2	Accutome Incorporated	42 Lloyd Avenue Malvern, PA (USA) 19355	www.accutome.com	Ophthalmic Knives, Blades, Surgical Instrument Tools
3	Acumen Surgical Pvt Ltd	PO 1459, Capital Road Jinnah, Sialkot (Pakistan)	www.acumensurgical.com	Knives, Blades, Surgical Instrument tools, Ophthalmic Medical Instruments
4	AD Instruments - Research	1949 Landings Drive Mountain View, CA (USA) 94043	www.adinstruments.com	Eye Movement Tracking Systems, Animal Function Monitors
5	Advanced Medical Optics (AMO)	3400 Central Expressway Santa Clara, CA (USA) 95051	www.visx.com	Laser: Refractive Cornea Surgery, VISX, LASIK, PRK
6	Alcon Laboratories Inc	6201 S Freeway Fort Worth, TX (USA) 76134	www.alconlabs.com	Ophthalmic Knives, Blades, Surgical Instrument tools
7	Allergan, Inc	P.O. Box 19534	http://www.allergan.com/site/	
8	American Surgical Instruments Corporation (ASICO)	26 Plaza Drive Westmont, IL (USA) 60559	www.asico.com	Ophthalmic Knives, Blades, Surgical Instrument tools
9	Anchor Products Co	52 Official Rd Addison, IL (USA) 60101	www.anchorsurgical.com	Knives, Blades, Surgical Tools, Ophthalmic Instrument
10	Appasamy Associates - Ophthalmic Instruments	No 20 SBI Officers Colony First Street, Chennai, Tamil Nadu (India) 600 106	www.appasamy.com	Ophthalmic Knives, Blades, Surgical Instrument tools
11	Applied Science Laboratories (ASL) - Eye Tracking	175 Middlesex Turnpike Bedford, MA (USA) 01730	www.a-s-l.com	Eye Movement Tracking Systems
12	ARC Laser	Von-Brentano-Str 31C Eckental Forth (Germany) D-90542	www.arclaser.de	Laser: Retinal, Photocoagulator, Trabeculoplasty
13	Aurolab	LAICO Building 72, K.K.Salai, Gandhi Nagar	www.aurolab.com	Intraocular lenses, Suture Needles pharmaceutical drugs,

No	Manufacturer	Address	Website	Products
		Madurai - 625 020, Tamil Nadu		Microsurgical Ophthalmic blades, Bipolar Coagulator
14	Avotec Inc	603 N Buck hendry way Stuart, FL (USA) 34957	www.avotec.org	Eye Movement Tracking Systems
15	Bausch & Lomb	One Bausch & Lomb Place Rochester, NY (USA) 14604	www.bausch.com	Laser: Refractive Cornea Surgery, VISX, LASIK, PRK
16	BioControl Systems	PO 19569, Stanford, CA (USA) 94309	www.biocontrol.com	Eye Movement Tracking Systems
17	Boss Instruments - Surgical Instruments	1838 Elm Hill Pike #119 Nashville, TN (USA) 37210	www.bossinst.com	Ophthalmic Knives, Blades, Surgical Instrument tools
18	Canon Inc - Headquarters	30-2 Shimomaruko, 3-chome Ohta-ku, Tokyo (Japan) 146-8501	www.canon.com	
19	Carl Zeiss	5160 Hacienda Dr Dublin, CA (USA) 94568	www.meditec.zeiss.com	Camera, Retinal Imaging System corneal topography, Keratometer, ophthalmometers. Laser: refractive cornea surgery, VISX, LASIK, PRK. Laser: Retinal, Photocoagulator, Trabeculoplasty Light Bulbs, Lamps: Surgical exam Microscopes: Surgical, Medical, slit lamps, refractor instruments Tonometers, Glaucoma Test Instruments
20	Duckworth Kent Surgical Instruments	Terence House, 7 Marquis Business Center, Royston Rd Baldock, Herts (UK) SG7 6XL	www.duckworth-and-kent.com	Ophthalmic Knives, Blades, Surgical Instrument tools
21	Eagle Laboratories	10201 Trademark Street, Suite A Rancho Cucamonga, CA (USA) 91730	www.eaglelabs.com	Ophthalmic Knives, Blades, Surgical Instrument tools
22	ELEN Laser	Via Baldanzese 17 Calenzano, Florence (Italy) 50041	www.elengroup.com	Laser: Capsulotomy, Selective Trabeculotomy (SLT)

No	Manufacturer	Address	Website	Products
23	Emerald Surgical Company	Factory Roras Road Sialkot (Pakistan)	www.emeraldsurgical.com	Ophthalmic Knives, Blades, Surgical Instrument tools
24.	Escalon Medical Corp - Headquarters	2440 South 179th Street New Berlin, WI (USA) 53146	www.escalonmed.com	Camera, Retinal Imaging System Knives, Blades, Surgical Instrument tools, Ophthalmic, Ophthalmoscope, Retinal Imaging, Ultrasound: Diagnostic, Ophthalmic, Pachymeter vascular Doppler, Blood Flow Monitors
25	Eyequip - Corneal Topography	5150 Palm Valley Rd #305 Ponte Vedra Beach, FL (USA) 32082	www.eyequip.com	Corneal Topography, Keratometer, ophthalmometers
26	Fritz Ruck Ophtalmologische	Julicher Strabe 115 Systeme GmbH,Eschweiler-Durwib (Germany) 52249	www.fritzruck-gmbh.de	Ophthalmic Knives, Blades, Surgical Instrument tools
27	Haag Streit	Verkauf, Kundendienst Schweiz Gartenstadstrasse 10 Koniz (Switzerland) CH-3098	www.haag-streit.com	Corneal Topography, Keratometer, Ophthalmometers, Furniture: Hospital Beds, Exam Tables, Light Bulbs, Lamps: surgical exam, optical lens, Slit Lamps, refractor Instruments, Tonometers, Glaucoma test, Instruments, Vision Test Instrument, Acuity Eye Charts
28	Heidelberg Engineering - Headquarters	Strasse 30 Hauptmann Gerhart, Dossenheim (Germany) 69221	www.heidelbergengineering.com	Corneal Topography, Keratometer, ophthalmometers, ophthalmoscope, Retinal Imaging Ultrasound: diagnostic, ophthalmic, pachymeter
29	Heine	Kientalstrasse 7 Herrsching (Germany) D-82211	www.heine.com	Headlamps, Headlights: Fiberoptic laryngoscope, bronchoscope, rhinoscope, light bulbs, lamps: surgical exam, loupe magnifiers, ophthalmoscope, retinal imaging, otoscopes, scales:

No	Manufacturer	Address	Website	Products
				medical, digital sigmoidoscope, anoscope, upper GI, endoscopy, slit lamps, refractor instruments, Sphygmomanometers (NIBP)
30	Howard Instruments Inc	4749 Appletree Lane Tuscaloosa, AL (USA) 35405	www.howardinstruments.com	Ophthalmic Knives, blades, surgical instrument tools
31	HS International	5040 Commercial Circle Unit A Concord, CA (USA) 94520	www.hsisurgical.com	Ophthalmic Knives, Blades, Surgical instrument tools
32	Huco Vision	PO Box 147 St Blaise (Switzerland) CH-2072	www.hucovision.com	Ophthalmic Knives, Blades, Surgical instrument tools
33	Insight Instruments Inc - Retinal Endoscope	2602 SE Willoughby Blvd Stuart, FL (USA) 34994	www.insightinstruments.com	Endoscopy Equipment, endoscopes headlamps, headlights: Fiberoptic Ophthalmoscope, Retinal Imaging
34	Iridex Corp	1212 Terra Bella Avenue Mountain View, CA (USA) 94043	www.iridex.com	Laser: Retinal, Photocoagulator,
35	Iscon Surgicals Ltd - Syringes, Needles, Blades	22-4 Heavy Industrial Area Jodhpur, Rajasthan (342 001)	www.isconsurgicals.com	Ophthalmic Knives, Blades, Surgical instrument tools
36	Kashmir Surgical Works	1888-B10 Baldev Nager Ambala, Haryana (India) 134 007	www.kashmirsurgicals.net	Corneal topography, keratometer, ophthalmometers fiber optic: Illuminator lights laryngoscope, bronchoscope, rhinoscope, loupe magnifiers, slit lamps, refractor instruments specula, vaginal speculum
37	Katena Products Inc - Surgical Eye Instruments	4 Stewart Court Danville, NJ (USA) 07834	www.katena.com	Ophthalmic Knives, Blades, surgical instrument tools
38	Konan Medical Corporation	10-29, Miyanishicho Nishinomiya, Hyogo (Japan) 662-0976	www.konan.com	Corneal topography, keratometer, ophthalmometers, Microscopes: surgical, medical

No	Manufacturer	Address	Website	Products
39	Kowa Company Ltd	6-29 Nishiki 3 Chome Naka Ku, Nagoya (Japan) 460 0003	www.kowa.co.jp	Activated Carbon, Camera, retinal imaging system, corneal topography, keratometer, ophthalmometers cough, cold medicine, Non-prescription OTC optical lens, pain relievers, Non-prescription OTC, analgesics pharmaceuticals: dermatology, Acne, psoriasis, eczema, pharmaceuticals: ophthalmic eye medication, pharmaceuticals: patented drugs, slit lamps, refractor instruments, tonometers, glaucoma test instruments, Vitamin B-1, B-2, B-6, B-12, Riboflavin
40	La Precision Mosane (LPM)	Rue Bellaire 18B Rotheux Rimieres (Belgium) B-4120	www.precision-mosane.be	Ophthalmic Knives, Blades, Surgical instrument tools
41	LaserSight Technologies Inc	6848 Stapoint Ct WinterPark, FL (USA) 32792	www.lase.com	Laser: Refractive Cornea Surgery, VISX, LASIK, PRK
42	LKC Technologies Inc -	2 Professional Dr #222 Gaithersburg, MD (USA) 20879	www.lkc.com	Eye movement tracking systems visual electrophysiology
43	Lumenis	Atidim Science Industrial Park Neve Sharett, PO 13135 Tel Aviv (Israel) 61131	www.lumenis.com	Laser: Capsulotomy, Selective Trabeculotomy (SLT)
44	Marco Ophthalmic Inc	11825 Central Parkway Jacksonville, FL (USA) 32224	www.marcooph.com	Corneal topography, keratometer, ophthalmometers, slit lamps, refractor instruments, tonometers, glaucoma test instruments
45	Massie Laboratories Inc (MLI)	5775 West Las Positas Blvd Pleasanton, CA (USA) 94588	www.massie-labs.com	Ophthalmoscope, Retinal Imaging

No	Manufacturer	Address	Website	Products
46	Mastel Precision Inc	2843 Samco Road Rapid City, SD (USA) 57702	www.mastel.com	Ophthalmic Knives, blades, surgical instrument tools
47	MD Biotech Inc	511 Burroughs St Morgantown, WV (USA) 26505	www.mdbiotechinc.com	Biometric Reader, Scanner: Iris, Fingerprint, Facial Corneal Topography, Keratometer, Ophthalmometers
48	Medi Alexa Engineering Co	Wazirabad Road Mohallah Muslim Town, Ugokie Sialkot (Pakistan)	www.medialexa.com	Ophthalmic Knives, blades, surgical instrument tools
49	Medical Instrument Development Labs Inc	14477 Catalina Street San Leandro, CA (USA) 94577	www.midlabs.com	Ophthalmic Knives, blades, surgical instrument tools
50	MedLogics	26061 Merit Circle #102 Laguna Hills, CA (USA) 92653	www.mlogics.com	OphthalmicKnives, blades, surgical instrument tools
51	Medtronic	6743 Southpoint Drive North Jacksonville, FL (USA) 32216	www.solan.com	Ophthalmic Knives, blades, surgical instrument tools
52	Moria - LASIK Surgery	15 rue Georges Besse Antony (France) 92160	www.moria-surgical.com	Ophthalmic Knives, blades, surgical instrument tools
53	Nidek - Headquarters	34-14 Maehama Hiroishi-cho Gamagori, Aichi (Japan) 443-038	www.nidek.co.jp	Ophthalmic equipment
54	Norwood Abbey Ltd	470 Collins St, Level 7 Melbourne, Victoria (Australia) 3000	www.norwoodabbey.com.au	Laser: Refractive Cornea Surgery, VISX, LASIK, PRK
55	Oasis Medical Inc	510-528 S Vermont Ave Glendora, CA (USA) 91740	www.oasismedical.com	Ophthalmic Knives, blades, surgical instrument tools
56	Oculus Opthalmic Diagnostics	18902 NE 150th St Woodinville, WA (USA) 98072	www.oculus.de	Camera, retinal imaging system corneal topography, keratometer, ophthalmometers Furniture: Hospital beds, exam tables, Micro -scopes: surgical, medical, vision test instrument, acuity eye charts.

No	Manufacturer	Address	Website	Products
57	Ophthalmic Technologies Inc	37 Kodiak Avenue Unit 16 Downsview, Ontario (Canada) M3J3E5	www.oti-canada.com	Corneal topography, keratometer, ophthalmometers endoscopy Equipment, endoscopes, Ultrasound: diagnostic ophthalmic, Pachymeter
58	Optikon 2000 International SpA	Via del Casale di Settebagni 13 Roma I-00138	www.optikon.com	Corneal topography, keratometer, ophthalmometers, phacoemulsification, corneal microkeratome, tonometers, Glaucoma Test Instruments Ultrasound: Diagnostic Ophthalmic, Pachymeter. Vitrectomy Systems, Probes
59	Paradigm Medical Industries Inc	2355 South 1070 West Salt Lake City, UT (USA) 84119	www.paradigm-medical.com	Ophthalmoscope, retinal imaging tonometers, glaucoma test instruments, ultrasound: diagnostic ophthalmic, pachymeter
60	Paramount Surgimed Ltd	Plot no 1 LSC Okhla Main Road Okhla Industrial Area Phase EE New Delhi (India) 110 020	www.paramountblades.com	Ophthalmic Knives, blades, surgical Instrument tools
61	Refractec Inc - Conductive Keratoplasty	5 Jenner #150 Irvine, CA (USA) 92618	www.refractec.com	Keratoplasty: Conductive, Thermal
62	Rhein Medical	5460 Beaumont Center Blvd Suite 500 Tampa, FL (USA) 33634	www.rheinmedical.com	OphthalmicKnives, blades, surgical instrument tools
63	Ribbel International Ltd	5A-4 1st Floor Ansari Rd Darya Ganj, New Delhi 110002 India	www.ribbel.com	OphthalmicKnives, blades, surgical instrument tools
64	Roboz Surgical Instrument Co Inc.	PO 10710 Gaithersburg, MD (USA) 20898	www.roboz.com	Ophthalmic Knives, Blades, surgical instrument tools

No	Manufacturer	Address	Website	Products
65	Schwind Eye Tech Solutions	Mainparkstrasse 6-10 Kleinostheim bei Aschaf-fenburg (Germany) D-63801	www.eye-tech-solutions.de	Laser: Refractive Cornea Surgery, VISX, LASIK, PRK
66	Star Ophthalmic Instruments Inc	7101 Adams St Suite 2 Willowbrook, IL (USA) 60521	www.starop.com	Ophthalmic: Used Equipment, Repair
67	Surgical Specialties Corporation	100 Dennis Drive Reading, PA (USA) 19606	www.surgspec.com	Ophthalmic Knives, blades, surgical instrument tools
68	Surgin Inc	14762 Bentley Circle Tustin, CA (USA) 92780	www.surgin.com	Ophthalmic Knives, blades, surgical instrument tools
69	Tomey Corporation	2-11-33 Noritakeshinmachi Nishi-ku, Nagoya (Japan) 451-0051	www.tomey.co.jp	Corneal topography, keratometer, ophthalmometers, slit lamps, refractor instruments Ultrasound: diagnostic ophthalmic, pachymeter
70	Topcon	75-1 Hasunuma-cho Itabashi-ku, Tokyo (Japan) 174-8580	www.topcon.co.jp	Camera, Retinal Imaging System corneal topography, keratometer, ophthalmometers, GPS systems: navigation, micrometers, laser dimension, microscopes: surgical, medical slit lamps, refractor instruments, tonometers, glaucoma test instruments, vision test instrument, acuity eye charts
71	Valley Forge Scientific Corp (VFSC)	3845 Corporate Centre Dr St Charles, MO (USA) 63304	www.synergeticsusa.com	Ophthalmic Knives, blades, surgical instrument tools
72	WaveFront Sciences Inc	14810 Central Ave Southeast Albuquerque, NM (USA) 87123	www.wavefrontsciences.com	Corneal topography, keratometer, ophthalmometers, semiconductor, wafer inspection, metrology

OPHTHALMIC INSTRUMENTS AND EQUIPMENTS MANUFACTURERS -INDIA

Manufacturer	Address	Website	Products
Appasamy associates	20, sbi officer's colony, first street, p.h. Road, arumbakkam, Chennai 600106, Tamilnadu, India	Http://www.appasamy.com	Opthalmic & optical equipments
Ascon medical instruments pvt. Ltd.	10/17, 5th street, Dr. Thirumurthi nagar, Nungambakkam, Chennai 600034, Tamilnadu, India	http://www.asconindia.org	Ophthalmic equipments
Aurolab	Laico building 72, K.K.Salai, Gandhi nagar, Madurai - 625 020 Tamil Nadu, India	http://www.aurolab.com	Intraocular lenses, suture needles, pharmaceutical drugs, microsurgical ophthalmic blades, bipolar coagulator
Biomedix optotechnik & devices Pvt. Ltd.	P.O.Box No. 2751, II floor, Basava Nivas, No. 29, K. H. Road, bangalore 560027, Karnataka, India	Http://www.biomedixdevices.com	Medical ophthalmic equipments viz., a-scan biometer, phaco emulsification system
Biotech vision care	Plot 555, 556, 557, near Subham tex-o-pack Khatraj – Vadsar Road, Kathraj, Kalol taluka, Gandhinagar 380006, Gujarat, India	Http://www.biotechvisioncare.com	Intra ocular lenses, viscoelastics, sodium hylouranate and other ophthalmic solutions
Central optical works	125- Lawrance Road, Opp. Hotel Batra Palace, Ambala 133001, Haryana, India	Http://www.laboratoyitems.com	Optical Microscopes, models, charts, sorgical-microscopes
Chona Surgical Co.	155-156, aggarwal chamber III, Vikas Marg, Shakarpur, Delhi 110092, India		Ophthalmic instrument and equipments
Dharshini Enterprises	No.4, Tankbund Road, Nungambakkam, Chennai 600034, Tamilnadu, India		Ophthalmic instruments
Dsa exports	7/1, Usha Ganj, NR. Shubham Gas Co., Indore 452001, Madhya pradesh, India	Http://www.dsaexports.com	Ophthalmic instruments

Manufacturer	Address	Website	Products
Ideal optics ltd.	3rd flr., Narottam Complex, Bhuyangdev cross Rd., Sola Road, Ahmedabad 380061, Gujarat, India		Manufacturers & exporters of P.M.M.A. (one piece & three piece) intraocular lenses & microsurgical knives.
International Medical Devices Pvt. Ltd.	17, Industrial Estate, Maruti Complex, Sector-18, Palam, Gurgaon-122015, Haryana, India	Http://www.imdindia.com	Intracular lens, opthalmic solutions
International Medical Devices pvt. Ltd.	17, Industrial Estate, Maruti Complex, Sector-18, Palam, Gurgaon 122015, Haryana, India	Http://www.imdindia.com	Manufacturers & exporter. of intra ocular lenses, ophthalmic solution & equipment.
Iscon Surgicals Ltd.	22/4, Heavy Indl. Area, Jodhpur 342003, Rajasthan, India	Http://www.pricon.org	Disposable syrings, needle, I.V. Sets, optharmic cannulae, instruments
Kamal Kardio Kare	1st floor, D.R.Towers (dotty art building) 126, Dispensary road, Bangalore 560001, Karnataka, India	Http://www.mahajanophthalmic.com	Ophthalmic surgical instruments & equipment
Khosla Surgicals	"Dwarkashish" A-158, SharkarPur, Vikas Marg, Delhi 110092, India	Http://www.geetasurgicals.com	Opthalmic instruments & equipments, titanium instruments
Madhu Instruments	5/12 AB, Industrial ara, Kirti Nagar, Delhi 110015, India	Http://www.madhuinstrumetnts.com	Ophtalmic instruments, surgical equipment
Medicare Instruments	No. 6, 5th Cross, Malleshwaram, Bangalore 560003, Karnataka, India		Opthalmolgy instruments and af instruments and equipment
Medicure Instruments	306, Agarwal Chamber-IV, 27, Veer Savarkar block, Shakarpur, Vikas Marg, Delhi 110092, India		Manufacturers & exporter. Of microscope (eye & ent) coloposcope, slit lamp, synoptophore, keratometer, lensometer, trial set, cautry & surgical instruments
Microtrack surgicals	A/38, Adarsh-2, Indl. Est., B/H Aashish manglam cinema,		Manufacturers. Of all type of opthalmic surgical blades &

Manufacturer	Address	Website	Products
	Odhav, Ahmedabad 382415, Gujarat, India		instruments, crescent blades, lancetip blade, mvr blades.
Norville Autoflow India Pvt. Ltd.	D-8/4, t.t.c. Industrial Area, M.I.D.C. Turbhe, Navi Mumbai 400705, Maharashtra, India		Ophthalmic lenses machinery
Omni Lens Pvt. Ltd.	5, samruddhi, Opp. Sakar-III, Navrangpura, Ahmedabad 380014, Gujarat, India	Http://www.omnilens.biz	ISO 9001Co. Manufacturers & exporters of (ce certified) pmma IOL and aquafold (acrylic) foldable lenses, ophthalmic equipment.
Ophtechnics Unlimited	2209, Phase-IV, DLF city, Gurgaon 122002, Haryana, India		Manufacturers & exporters of ophthalmic products PMMA intraocular lens, foldable intraocular lens, surgical sponges(pva & cellulose), surgical blades, titanium & stainless steel surgical instruments, endocapsular tension rings, hpmc viscoelastic, carbachol miotic, trypan blue, fluorescein sodium strip, schirmer tear test strip
Optilab	P.O. Box No. 77, old Khanderia Hospital Bldg., Station Road, Anand 388001, Gujarat, India	Http://www.eoptilab.com	Optical instruments
Ovation international	B-24, Kishori Apartment, Prabhumarg, Tilak Nagar, Jaipur 302004, Rajasthan, India	Http://www.ovationint.com	Manufacturer & exporters of intraocular lenses (pmma & foldable), vitreoretinal implants, microsurgery instruments, latest hard edge technology scissors, knives, cannulas, phaco & lasik ass., slit lamp, microscopes, vitrectomy, trypan blue, hpmc, carbachol.
Plantech Medical	58, Tirupati indl. Estate,	Http://www.plantechindia.com	Manufacturer & exporter of

Manufacturer	Address	Website	Products
Systems Private Limited	Nr. Jay Bharat Rangshala Comp., B/H. Amber Cinema, Saraspur, Ahmedabad 380024, Gujarat, India		ophthalmic equipment and instruments, refraction unit model - po-eu / cs-2000/ cs- 2000(sl) m slit-lamp-model-sl-100,operation table - optb-500, vision testing drum m doctor operative stool, surgeon chair for O.T. M phaco stand, phoroptor arm
Relite optical industries	4-1-354/H, opp. Reddy hostel near hotel Jaya, Abids, International, Hyderabad 500001, Andhra Pradesh, India		All kinds of ophthalmic lenses
Rolex Surgicare Inc.	907/7, Gidc Estate, Nr Gocool, Icecream, Sector-28, Gandhinagar 382028, Gujarat, India	Http://www.rolexsurgical.com	Manufacturers. & exporter of ophthalmic chair unit & equipment / hospital equipment
Ronak Overseas Company	Near Gendigate, Sant Kabir road, P.O. Box 33, Vadodara 390001, Gujarat, India	Http://www.ronakoverseas.com	Ophthalmic lenses
Segal Instruments Exports	368, Kalbadevi Road, Mumbai 400002, Maharashtra, India	Http://www.segaloptics.com	Surgical instruments & ophthalmic equipment, meeting the demand for precision, the world over
Shivam ophthal	35, Chinubhai tower, Ashram road, Ahmedabad 380009, Gujarat, India		Ophthalmic micro instruments
Smr Ophthalmic Pvt. Ltd.	4,Vijay Indl.Est.Link Road, Malad (W), Mumbai 400064, Maharashtra, India	Http://www.smrindia.com	Manufacturers & exporters of : artificial eyes, optical implants, micro-surgical blades & knives (round & flat stock) optikut - bladez - diamatrix (all sizes), iols-usiol, orion iol, sidra iol, aurolab iol, pmma & foldable iols m pst trays, ocular inst. Hydroxypatite implant, entire range of opthalmic instruments

Manufacturer	Address	Website	Products
Sona International	82, Rajender Nagar, near Sona Pressure Cookers, Opp. Dass factory, P.O.Mohan nagar, Ghaziabad 201007, Uttar pradesh, India	Http://www.sonainternational.in	Autoclaves, portable, sterilizers, medical surgical instruments equipments, hospital supplies laboratory scientific, pressure cookers, aluminium aluminum, sterlizers, stainless steel, dressing drums, goods cookwares
Sunayana Surgicals	465, Somwar Peth, near Dharuwala pool, Pune 411011, Maharashtra, India	Http://www.sunayanasurgicals.com	Opthalmic (eye) instrument and equipment
Suraj Hi-tech Pvt. Ltd.	Cpr-4, Watu Tank Road, MMDA colony, Arumbakkam, Chennai 600106, Tamilnadu, India		Opthalmology equipment
Susruta Instruments Pvt. Ltd.	8-10, ist floor, shah chambers, CTM Charrasta, Ahmedabad 380026, Gujarat, India	Http://www.susruta-instruments.com	Manufacturers & exporters of : m ophthalmic micro surgical knives (ce 0434) M reusable ophthalmic cannulas M.S.S.&TI instruments M micro surgical ENT
Topmost inst. Corp. Of india	4284, Cross road No.2, Ambala Cantt, Haryana, India		Manufacturers & exporters of surgical operating microscopes, slit lamps, keratometer, colposcope, lensometers, cryo, bipolar, phaco & IOL
Vaansari Marketing Services	3-B, Lakshmi street, Thirumangalam Road, Chennai 600049, Tamilnadu, India	Http://www.vaansari.com	All lasers, opthalmic, ENT, O.T. Equipment, drills, CCD cameras, endoscopes, light source & otoscope, etc.
Visine Instruments	145-A, Dyal Bagh, Bayal road, Ambala Cantt 133001, Haryana, India	Http://www.visineinstruments.com	Opthalmic, ENT, optical, surgical instruments & equipment
Western Surgical Corporation	No. 204, 2nd floor, Prasad Chambers, Near Roxy Cinema, Opera house, Mumbai 400004, Maharashtra, India	Http://www.gatewaytoindia.com/western	Surgical instruments and equip-ment, opthalmic instruments

ANNEXURE

III. MODEL SECONDARY SETUP

Introduction

This annexure is attached to this report with a view to give a snapshot of a secondary eye hospital's functioning. Aravind Eye Hospital, Theni is the first satellite hospital of Aravind started in 1985, situated 80 Kms to the north of Madurai, Tamil Nadu.

Location and service area

Theni Aravind Eye Hospital is located in Theni - Allinagaram Municipality in the Theni Taluk of Theni District. Theni Taluk is a small town with a population of 111,542. Aravind Eye Hospital, Theni serves Andipatty, Uthamapalayam, Periyakulam and Bodinayakannur Taluks of Theni District, falling within the radius of 50km and covering a population of 1.1 million. Besides this primary service area the hospital also covers the neighbouring areas in Kottayam and Idukki districts of Kerala state with a population of 3.1 million (3,082,867) and thus serving a total population of 4.2 million.

Builtup area

Paying section

Ground Floor - 9,840 Sq. Feet
First Floor - 9,840 Sq. Feet
Second Floor - 9,840 Sq. Feet
Third Floor - 780 Sq. Feet
Total Area - 30,300 Sq. Feet

Free Section

Ground Floor - 1,800 Sq. Feet (OP area: 1180 Sq. Feet; Nursing Hostel:620 Sq.Feet)
First Floor - 1,800 Sq. Feet
Second Floor - 1,800 Sq. Feet
Total Area - 5,400 Sq. Feet

Total Area (paying + free side) – 35,700 Sq.Feet

List of instrument and equipments

Name of Equipment	Number	Manufacturer / Supplier
Outpatient department		
1. Direct Ophthalmoscope	5	Keeler
2. Indirect Ophthalmoscope	3	Keeler
3. Tonometer	2	Riester
4. Torch (Electric)	15	Eveready
5. Retinoscope streak - Electric	6	Heine beta
6. Trial frame	6	Baliwalla
7. Trial set	5	Baliwalla
8. Slit Lamp	7	Topcon
9. Keratometer	1	Ascon
10. Hess Chart Board	1	
11. A scan	1	Sonomed

Name of Equipment	Number	Manufacturer / Supplier
12. BP apparatus	2	Indian electronics Allied Products
13. Stethoscope	2	Microtone Instruments limited
14. Torch (cell)	8	Eveready
15. Gonio lens (3 Mirror – 1: 1 Mirror -2)	3	Volk
16. 20D lens	3	Volk
17. 90D Lens	1	Volk
18. 78D Lens	1	Volk
19. Applanation Tonometer	3	Haag-Streit
20. Yag Laser, 532, Green	1	Iris Medical
21. Humphery Field Analyser	1	Zeiss
22. Fundus Camera	1	Topcon-Tokyo optical company Ltd, (OTRC – 50Ex RC)
23. YAG laser 1064	1	Zeiss
24. Autorefractometer	1	Topcon
25. Lensometer	1	Ascon
26. Non Contact Tonometer	1	Topcon
27. Wide Field laser lens	1	Ocular Instruments

Lab

1. Microscope	1	Nikon
2. Colorimeter	1	Photochem-5
3. Centrifuge	1	
4. Blood cells counter	1	
5. Syringe cutter	1	Insta Need
6. Gluco meter	1	Advantage

Ward

1. BP apparatus	1	Allied products
2. Stethoscope	1	Microtone
3. Tonometer	1	Schiotz
4. Torch (cell)	1	Eveready
5. Slit Lamp	1	Topcon

Operation theatre

1. Operating microscope	4	Takagi, Zeiss	12. Autoclave	3	Hoslab
2. Operating light	2	Segal optics	13. Oxygen Cylinder	1	Sivaji
3. Cryo unit	1	Ascon	14. Cooker Autoclave	1	Hoslab
4. Tonometer	1	Riester	15. Suction Apparatus	1	
5. BP apparatus	2	Allied products	16. Ultra sonic Cleaner	1	
6. Stethoscope	2	Microtone	17. Sealing Machine	1	Sevana
7. Bipolar Coagulator	6	TL instruments / Aurolab -3	18. Needle Cutter	1	Saratech electrical Syringe & needle destroys
8. Phaco machine	2	AMO Sovereign / AMO OPSYS	19. Compressor	1	Elgi
9. Vitrectomy machine	1	Allergan	20. Torch Cell	2	Eveready
10. OT Care	1	OT safe	21. Television	1	Samsung
11. Instaclave	1	Gold's worth	22. Camera	1	Zeiss

Camp

1.	Direct Ophthalmoscope	1	Keeler
2.	Retinoscope Streak Cell	2	Heine
3.	Torch (Electric)	8	Eveready
4.	Tonometer	4	Schiotz
5.	BP Apparatus	2	
6.	Stethoscope	2	Microtone
7.	Torch (cell)	6	Eveready
8.	Trail Set & Trail Frame	3	Balliwalla

ICU

1.	ECG Machine	1	Maestros
2.	Oxygen Cylinder	1	Sivaji
3.	B.P Apparatus	1	
4.	Stethoscope	1	Microtone
5.	Suction Apparatus	1	Gomco
6.	Nebulizer	1	Aerofamily
7.	Pulse Oxymeter	1	Nellcor
8.	Torch (cell)	1	Eveready

Human resource

Clinical Team	-	53
Chief Medical Officer	-	1
Medical Officer	-	1
PG / Fellow	-	7
Paramedical Staffs	**-**	**25**
Nursing Coordinator	-	1
Refractionist	-	7
OP Nurse	-	5
Counselor	-	2
OT Nurse	-	6
Ward Nurse	-	2
Lab Technician	-	1
Instrument Technician	-	1
Trainees	**-**	**19**
Refractionist	-	5
OP Nurse	-	4
Counselor	-	1
OT Nurse	-	7
Ward Nurse	-	2
Administrative Team	**-**	**31**
Manager	-	1
Assistant Manager	-	1
Accountant	-	1
Electronic Data Processing (EDP)	-	1
Camp Organizer	-	1
School Screening Organizer	-	1
Telemedicine / Stores	-	1
MRD / Reception	-	2
House Keeping	-	2
Sanitary Workers	-	8
Security	-	5
Driver	-	1
Gardner	-	2
Electrician (Part-time)	-	1
Trainees	-	03
MRD / Reception	-	3
Total Trainees	-	22
Full Time Staffs	-	62
Vision Centre Staff	-	13

Bed strength

The hospital was started with 100 beds, of which 40 was paying and 60 was for camp (free) patients. The bed strength in the paying section has not been increased till now. The total number of beds at present in all sections of the hospital is 163.

Section		No. of Beds
Paying Section	-	40
Direct Walk-in (Free)	-	23
Camp Section (Free)	-	100
Total Beds	-	163

Performance

The performance of the hospital in terms of both outpatient and inpatient services for the past 5 years are depicted below.

Outpatient statistics

	Year				
Patients (New + Review)	2002	2003	2004	2005	2006
Paying	40,149	45,043	49,010	54,427	59,086
Direct walk-in (Free)	19,886	18,894	23,209	23,424	21,385
Camp (Free)	21,799	26,167	19,532	25,703	25,193
Total	81,834	90,104	91,751	103,554	105,664

Inpatient statistics

	Year									
Patients	2002		2003		2004		2005		2006	
	Cataract	Others	Cataract	Others	Cataract	Others	Cataract	Others	Cataract	Others
Paying	1,367	496	1,531	693	1,730	592	1,851	1,110	2,000	1,367
Direct (Free)	855	121	1,070	269	1,256	338	1,512	503	1,887	372
Camp (Free)	4,216	81	4,286	86	5,080	117	5,151	160	4,442	167
Total	6,438	698	6,887	1,047	8,066	1,047	8,514	1,773	8,329	1,906
Grand Total	**7,136**		**7,934**		**9,113**		**10,287**		**10,235**	

Vision centers statistics

The performance of all the Vision Centers till now is illustrated in the table given below:

All vision centers performance (till December 2006)

Out Patients

	Total Months of Service	OP so far	Avg OP / month	Avg OP / Day
Ambai	33	5814	176	7
Andipatti	25	9117	365	15
Bodi	16	5426	339	14
Chinnamanur	10	2810	281	11
Periyakulam	8	2274	284	11
Total	**92**	**25441**	**1445**	**58**

Spectacles

	Prescribed so far	Ordered so far	Avg Glasses / Month	Glass Acceptance Rate
Ambai	916	754	23	82 %
Andipatti	1129	956	38	85 %
Bodi	945	777	49	82 %
Chinnamanur	370	330	33	89 %
Periyakulam	439	402	50	92 %
Total	**3799**	**3219**	**193**	**86 %**

In Patients

	Referred So far	Sur Done So far	Avg Ref / month	Avg Sur / month
Ambai	365	262	11	8
Andipatti	353	247	14	10
Bodi	306	188	19	12
Chinnamanur	112	72	11	7
Periyakulam	103	75	13	9
Total	**1239**	**844**	**68**	**46**

ABBREVIATION

WHO	World Health Organization
IAPB	International Agency for the Prevention of Blindness
INGO	International Non-Governmental Organization
CME	Continuing Medical Education
OP	Outpatients
IP	Inpatients
OPD	Outpatient Department
ICD	International Classification of Diseases

VISION 2020 The Right to Sight INDIA

S-390, Double Storey, Ground Floor
New Rajinder Nagar
New Delhi - 110 060
India

laico
LIONS ARAVIND INSTITUTE OF COMMUNITY OPHTHALMOLOGY

72, Kuruvikaran Salai, Gandhinagar, Madurai 625 020, Tamilnadu, India
Phone: 0452-4356500; Fax: 0452-2530984; www.aravind.org

ARAVIND EYE CARE SYSTEM

World Health Organisation
Collaborating Centre
For Prevention of Blindness