



2016
activity report
2017

ARAVIND
EYE
CARE
SYSTEM

*Vision:
Eliminate needless blindness*

Beauty is Joy!

Beauty touches our soul, making us feel alive.

Visitors to Aravind have often remarked at the various expressions of beauty they see at Aravind. In particular, they have admired the beautiful designs at the entrance of the buildings on special occasions. A result of the meditative artistry of Aravind's skilled housekeepers, the designs often reflect the theme of the occasion. Over the years, they have gained mastery over the art, which requires deftness of the hand, mental discipline and concentration.

The designs, made using flowers, colour powder and sand, also denote a prayer:
May anyone crossing this threshold carry with them only joy and beauty.

The cover and several pages in this report carry images of some of the designs by the housekeeping staff across all Aravind facilities.



*The vast universal suffering feel as thine:
Thou must bear the sorrow that thou claimst to heal;
The day-bringer must walk in darkest night.
He who would save the world must share its pain.
If he knows not grief, how shall he find grief's cure?
If far he walks above mortality's head,
How shall the mortal reach that too high path?
If one of theirs they see scale heaven's peaks,
Men then can hope to learn that titan climb.
God must be born on earth and be as man
That man being human may grow even as God.*

- Sri Aurobindo, from Savitri, Book VII, Canto VI



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Gandhiji's ideas of celibacy, non-violence, truthfulness, and simple life appealed to many people in the younger generation. His movement was not just political; there was also an effort to review the traditional dharma or culture of ancient India.

The Bhagavad Gita became popular and people started reading it to understand Karma yoga. I remember well reading it in those days.

At the same time Swami Vivekananda became very popular with us. His speeches were so powerful and inspiring, they made me look forward to doing something challenging and great.

I also read the teachings of Sri Ramakrishna Paramahansa, who had very little schooling, but who had known God in person. All these contacts influenced our thinking greatly in those days. We were not thinking of amassing money as our goal in life.

We always aspired to some perfection in our lives, like the realisation of God, or the reaching of higher level of consciousness in Yoga.

- Dr. Govindappa Venkataswamy



EYE CARE SERVICES

MISSION: Provide compassionate and quality eye care affordable to all

ARAVIND EYE HOSPITALS

Tertiary Eye Care Centres - 6

(Speciality Care, Research & Training)

Madurai 1976 | Tirunelveli 1988 | Coimbatore 1997

Pondicherry 2003 | Salem 2011 | Chennai 2017

Secondary Eye Care Centres - 6

(Cataract Services, Speciality Diagnosis)

Theni 1985 | Tirupur 2010 | Dindigul 2010 | Tuticorin 2012

Udumalpet 2012 | Coimbatore City Centre 2014

Aravind Community Eye Clinics - 6

Out-Patient Eye Care Centres

(Comprehensive Eye Examination, Treatment of minor ailments)

Melur 2004 | Tirumangalam 2005 | Cumbum 2008

Madurai City Centre 2009 | Sankarankovil 2010

Pondicherry City Centre 2011

Aravind Vision Centres - 61

Primary Eye Care Centres

(Comprehensive Eye Examination)

Free Eye Screening Camps

(Community Outreach Programmes)

More than 2,500 camps were conducted through which

577,350 patients were screened and

92,022 surgeries performed in the year-ending March 2017

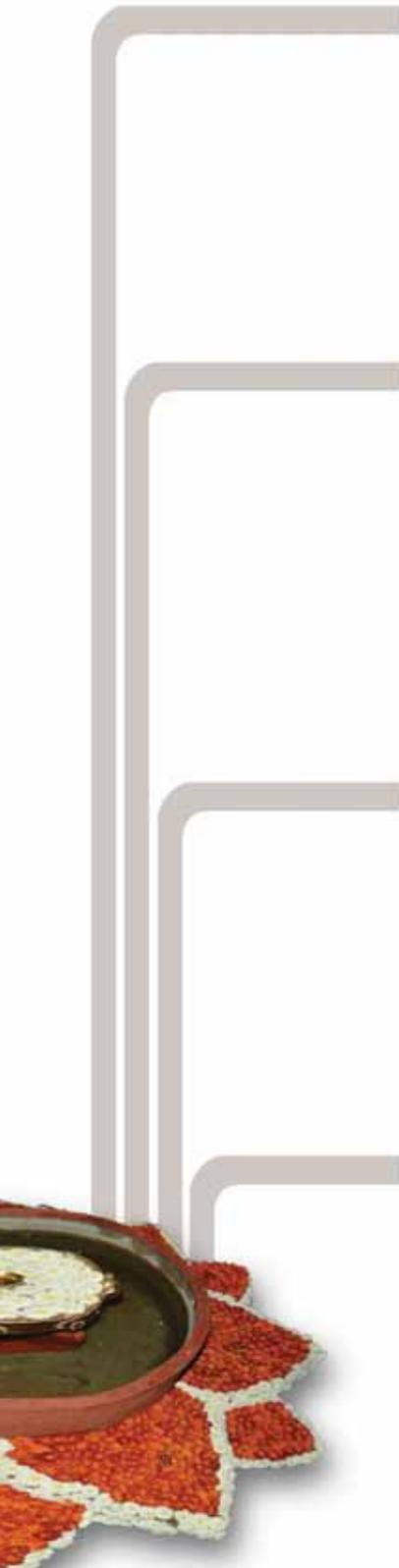
Aravind Eye Banks

5,356 eyes were collected and 2,792 eyes were utilised for surgery in the year-ending March 2017

4,067,265 outpatient visits were handled and 463,124 surgeries and laser procedures were performed in the year-ending March 2017



ARAVIND EYE
VISION: Eliminate



EDUCATION AND TRAINING

Aravind Postgraduate Institute of Ophthalmology
Lions Aravind Institute of Community Ophthalmology

MISSION: Develop ophthalmic human resources through teaching and training

Over 9,000 candidates trained from 100 countries
1,401 papers published

RESEARCH

Aravind Medical Research Foundation
Dr. G. Venkataswamy Eye Research Institute

MISSION: Provide evidence through research and evolve methods to translate existing evidence and knowledge into effective action

Basic and translational research | Clinical research | Operations research
Product development in eye care
129 research papers published ; 19 scholars received Ph.D

CONSULTANCY AND CAPACITY BUILDING

Lions Aravind Institute of Community Ophthalmology

MISSION: Enhance eye care through capacity building, advocacy, research and publications

Sharing best practices at Aravind | Advocacy in eye care | Publications
335 hospitals from 28 countries (including India) received
consultancy services in eye care management

OPHTHALMIC SUPPLIES

Aurolab

MISSION: Make quality ophthalmic products affordable and accessible to the vision impaired worldwide

Intraocular lens | Pharmaceuticals | Suture needles
Equipment | Surgical blades | Special products
Products exported to more than 160 countries worldwide

CARE SYSTEM
Needless Blindness



Aravind
completes
four decades
in eye care

*Silver Jubilee
Celebrations*



UVEA SERVICES, ARAVIND-MADURAI



HIGHLIGHTS 2016-17

The past year at Aravind was punctuated by a series of milestones. October 2016 marked the completion of four decades of compassionate service for sight. Aurolab and Uvea services celebrated 25 years of work.

A number of challenges in the external environment also characterised the past year. To bring about greater financial transparency, the Government of India demonetised the Rs. 500 and Rs. 1,000 notes overnight. It was a surprise move, catching everyone unprepared. To add to the challenge, the Chief Minister of Tamil Nadu passed away, paralysing the state government. The uncertainties arising out of the two events further aggravated the mood in the state, already besieged by a total failure of the monsoon, considered to be one of the worst in recorded history.

The acute crunch in cash flow in the community, political uncertainty and a failed monsoon should have had a dramatic and dampening impact on the patients seeking eye care, which is largely elective in nature. While there is no evidence of the impact of the happenings on the market, in general, at Aravind, the growth in patient volume was spectacular. Surgeries, including laser procedures and intravitreal injections, grew by 10%, which translates to about 40,000 additional surgeries during the year. The number of out-patient registrations also saw an increase, recording an unprecedented over four million visits in the course of the year. Aurolab, too, experienced a similar growth, with revenues increasing by 16%, buoyed by robust exports. The overall record growth during a year characterised by adversity is a testimony to the faith people have in the Aravind Eye Care System (AECS).

While Aravind has established itself as a provider of high-quality eye care at affordable prices, it is becoming increasingly clear that it is the compassionate care and the trust it builds, which is resulting in the consistent growth of its services. At one level, the trust of the millions of patients is a blessing, at the same time, it also challenges the organisation to preserve and strengthen this trust in it.

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Infrastructure

The construction of Aravind Eye Hospital in Chennai progressed as per schedule, aiming for inauguration in the coming year. Over the years, Aravind-Chennai is expected to grow into a centre of excellence in service providing eye care in significant numbers to the people of Chennai, its adjoining areas as well as the neighbouring districts in Andhra Pradesh and Karnataka. For the proposed Aravind Eye Hospital at Tirupati, all the procedural requirements leading to the approval of the building plans are in hand. The construction will begin in mid-2017.

Aravind Eye Hospital at Coimbatore is operating beyond its capacity and needs to urgently expand its infrastructure. With the purchase of the land adjoining the hospital, this has now become a possibility. During the year, four vision centres have been added taking the total to sixty one. It is interesting to observe that this network of sixty one vision centres handled over 524,000 outpatients visits during the year, far surpassing the total number of patients seen through comprehensive free eye camps. This initiative has the makings of a major innovation in the offing, of a strong alternate model to eye camps for providing care in the community.

Scaling of Vision Centres

At the last retreat of the Aravind Eye Care System, an audacious goal was proposed to promote the concept of primary eye care to cover a population of a billion. Consistently promoting the concept by building evidence of vision centres' impact and effectiveness, has



Mr. R.D. Thulasiraj and Dr. R.D. Ravindran with Mr. Mohammed Nasim, MP, Honorable Minister for Health and Family Welfare, Government of Bangladesh

started yielding results. Bangladesh Rural Advancement Committee (BRAC), the world's largest NGO has established three vision centres as a pilot venture, with Aravind's full involvement. BRAC intends to scale it up to 20 centres immediately and eventually expand it across the entire nation. Dr. R.D. Ravindran, Chairman, AECS and Mr. R.D. Thulasiraj, Executive Director, LAICO during their visit to Bangladesh in December 2016, shared with the country's Health Minister, the details of the functioning of a vision centre and its potential impact. This resulted in the sanctioning of an initiative to establish 400 vision centres across the country. Within India, the State Governments of Uttar Pradesh, Uttarakhand, Jharkhand and Chhattisgarh have all initiated actions towards establishing vision centres. These are at various stages of development. Looking at the combined population coverage of

Aravind Eye Hospital-Chennai



Bangladesh and the various states in India working on this, it is likely that this audacious goal of reaching a billion people could soon become a reality.

Cancer Genetic Testing Centre

Retinoblastoma, the cancer of the eye is the most common intraocular tumour among children. Unfortunately half of these are inherited. Aravind Medical Research Foundation (AMRF) has developed a cost-effective genetic testing methodology to help predict the disease in siblings, offspring and secondary tumours in the same patient. On October 26, 2016 a genetic testing laboratory was inaugurated at Aravind-Madurai. Even though, the number of people who will directly benefit from this centre will be small, in the coming years, it will play a significant role in reducing the occurrence of retinoblastoma and other inherited eye cancers. The facility extends its services to patients beyond AECS at an affordable cost.

October Summit

Originally conceived as a platform to discuss issues relating to effective delivery of eye care programmes and services, October Summit, over the years has developed an expectation amongst the healthcare fraternity. Bringing together people from diverse backgrounds, this year too, the summit witnessed several significant activities. The most sensitive and significant event was around the topic of *Practicing Responsible Medicine*. This was conducted in a think tank mode, going beyond eye care into the overall practice of medicine. Aravind realised that its strength and building community



Participants to the workshop on Practicing Responsible Medicine

trust stemmed out of providing eye care in an ethical and responsible manner. This was not just about being responsible for those who came to the hospital, but also exhibiting the same responsibility towards those who need but were not seeking care. The exploration was around expanding this notion across all of healthcare. The workshop brought about a deeper understanding of what responsible medicine is and how it could be put into practice to benefit both the patients and the hospitals - a true win-win paradigm.

The other important workshop was on *Priorities in Paediatric Eye Care Services, intervention models and research*. Jointly organised by Aravind and USAID, this international workshop brought together practitioners of paediatric eye care from thirteen countries.

Lighting the lamp and opening ceremony at the inauguration of Cancer Genetic Testing Laboratory at Aravind-Madurai





Dr. Suzanne Gilbert receives Dr. G.V. Endowment Award 2016. With her are (L-R) Dr. R.D. Ravindran, Dr. P. Namperumalsamy, Mr. G. Srinivasan and Mr. R.D. Thulasiraj

The major highlight of the October Summit was the Dr. G. Venkataswamy Endowment Oration, delivered by Dr. Suzanne Gilbert of Seva Foundation. Having known Dr. Venkataswamy for almost 30 years, she largely spoke about his life and contribution to eye care in her oration titled *Compassion in Action; Living a Life of Service*.

One of the hallmarks of Aravind's service continues to be its outreach work. Each year 2,500 eye camps are conducted. This vast experience is being continually

shared with many other eye hospitals across several countries through structured training programmes. During the October Summit, a long-felt need was fulfilled with the release of the Community Outreach Manual, a valuable compilation of all information necessary for effective outreach. This was a culmination of many years of work by Mr. R. Meenakshi Sundaram, Aravind's Outreach Manager and Seva volunteers, Ms. Julie. D. Johnston and Ms. Susan Spinola and the Aravind Communications team that provided editorial inputs and feedback.

Dr. Marilyn Miller addressing the audience at the workshop on Priorities in Paediatric Eye Care Delivery





Valedictory function of the 100th Instruments Maintenance course

Service Beyond Aravind

The spontaneous desire amongst the staff to support fellow human beings in distress is now emerging into an annual activity. Now in its third year, Angaadi, the great charity fest was a grand success, with the whole-hearted dedication and commitment of all employees. The event was held on December 17, 2016 at Madurai and later in Aravind-Pondicherry. This year's proceeds were donated to Aishwaryam Trust recognising its exceptional service in palliative care, and M.S. Chellamuthu Trust, for its inspiring work in supporting and rehabilitating mentally challenged people. Similarly, through the Residents Social

Responsibility (RSR) programme at Aravind-Madurai, the ophthalmology residents visited orphanages on special occasions, presented toys and clothes to the disadvantaged children there, and spent quality time with them. Sale of products made by visually challenged people was also organised to support them for the third consecutive year.

Instruments Maintenance Course Hits Centum

Aravind pioneered the concept of having an internal instruments and equipment maintenance department in an attempt to address an acute necessity. True to its

Staff members at the sale during RSR programme





Dr. S. Aravind with Dr. Jon Bjarni Thorsteinsson and Ms. Gudrun Bjort Yngvadottir at Aravind-Madurai

philosophy of sharing everything of value with others, this too soon translated into an offering as a training programme to facilitate other eye hospitals to set up similar maintenance facility.

This popular training programme was developed by Professor V. Srinivasan and the first course was offered in October 1996. The extreme usefulness of this course resulted in sustained demand with this four weeks' course being offered now six times a year. The 100th course was conducted in 2016 and this in itself was a cause for celebration. In addition to the 106 courses offered at Aravind as of last year, this training programme is also offered offsite in different countries to benefit clusters of hospitals in those regions. A total of 20 such courses were offered in other countries benefiting technicians from 22 countries. During the last year, four such offsite courses were offered, one each in Antigua (West Indies), Kenya, Egypt and Tanzania.

Building Sustainable Eye Care Programmes

LAICO's capacity building work around hospitals, vision centres and programmatic focus in underserved areas continues. During the year, LAICO as part of the consortium of mentor hospitals under Seva, got support from Standard Chartered Bank to mentor 11 hospitals. This along with grants from Seva-So-Hum project, Lavelle and Lions International saw the addition of 15 eye hospitals during the year, taking the total hospitals mentored to 335 spread across 28 countries.



Mr. R.D. Thulasiraj at the Hilton Cataract Initiative review meeting in Dubai, U.A.E

During the year, the prestigious project funded by Conrad N Hilton Foundation to mentor and build capacity of five eye hospitals in Africa, came to an end. The concluding review workshop was held in Dubai and it was also attended by Ms. Shaheen Kassim Lakha and Mr. Robert Miyashiro of Conrad N.Hilton Foundation. Dana center of John Hopkins is also engaged in this effort. In spite of the significant progress made by the five African hospitals, Hilton Foundation recognised the need for continued mentoring to make these hospitals sustainable, echoing Aravind's view on this. The request for the second phase of the project was approved with a grant of \$2 million. During the year, LAICO also agreed to partner with Chinese Eye Hospital Alliance, Operation Eyesight Universal and the Ministry of Health, Bangladesh to help in strengthening identified eye hospitals in their respective network.

LAICO had the honour of a visit by Ms. Gudrun Bjort Yngvadottir, Senior Vice President of Lions Club International and her husband Dr. Jon Bjarni Thorsteinsson in July 2016.

Standard Chartered Global Business Services Limited (formerly Scope International Private Limited) came forward to support some of Aravind's innovation to go beyond cataract services. Their support will help Aravind to make significant inroads into more effective management of corneal ulcers amongst the poor, development of a new cornea preservative medium with antifungal agents, enabling more comprehensive eye examinations in eye camps and enhanced diagnosis and management of Retinopathy of Prematurity (ROP) and corneal diseases.

PATIENT CARE

As Aravind's first facility in Madurai completes forty years in eye care service, the organisation looks back with a sense of gratification, on the impact it has had, on the lives of millions of visually impaired persons.

Like the banyan tree, which spreads its roots, Aravind is poised to set foot in Chennai, the capital city of Tamil Nadu, to spread its eye care services. Situated in Noombal village, on the city's Poonamallee High Road, Aravind-Chennai will be the organisation's biggest facility and will primarily cater to people from Chennai, Vellore, Tiruvallur and Kancheepuram, as well as to those from adjoining parts of Andhra Pradesh.

*Like the branches
on a tree, our
lives may grow in
different directions,
yet our roots
remain as one!*



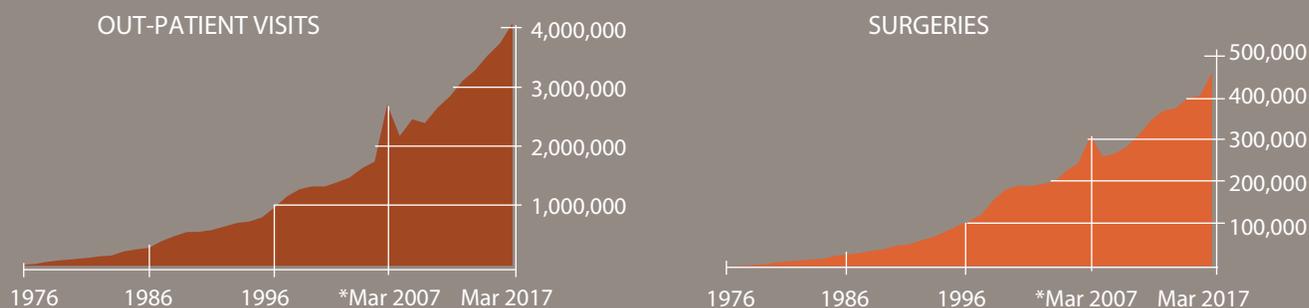
Performance: April 2016 - March 2017

	Total	Madurai	Theni	Tirunelveli	Coimbatore	Pondicherry
OUT-PATIENT VISITS						
HOSPITALS						
Paying (New+Review)	2,221,659	666,738	92,856	336,723	412,945	323,952
Free (New+Review)	550,374	180,576	21,503	81,524	123,241	102,535
OUTREACH						
Comprehensive camps	337,671	94,955	16,205	45,727	87,952	76,803
Diabetic Retinopathy screening camps	32,703	10,503	2,553	1,879	10,652	7,071
Workplace refraction camps	52,345	10,826	3,884	12,723	10,230	10,795
School children examined by Aravind staff*	61,447	8,488	2,271	5,498	34,199	8,809
Paediatric eye screening	75,425	-	1,110	1,669	827	71,819
Mobile van refraction camps	17,759	-	-	-	16,711	-
Total Out-patients through Outreach*	577,350	124,772	26,023	67,496	160,571	175,297
VISION CENTRES	524,269	217,272	61,607	116,287	41,230	63,229
COMMUNITY EYE CLINICS/CITY CENTRES	193,613	107,754	22,883	31,954	-	31,022
TOTAL OUT-PATIENT VISITS	4,067,265	1,297,112	224,872	633,984	737,987	696,035
SURGERIES						
Paying	242,344	86,170	7,123	37,028	50,990	35,468
Free walk-ins	128,758	48,554	3,590	16,256	29,648	21,327
Outreach	92,022	32,096	2,964	10,249	22,429	19,684
TOTAL SURGERIES	463,124	166,820	13,677	63,533	103,067	76,479

*Of the 324,096 children screened by teachers, 262,649 were found to be normal taking the total outreach screening to 839,999

Growth in Out-patient Visits and Surgeries since inception in 1976

Since inception, Aravind Eye Hospitals have handled over **52 million out-patient visits** and performed over **6 million surgeries**.



March 2007 statistics includes months from January 2006 to March 2007

* From year 2007, the statistics is for the financial year, April to March

Tirupur	Dindigul	Salem	Tuticorin	Udumalpet	CBE CC
48,642	76,326	137,191	59,458	34,288	32,540
7,528	-	11,498	9,172	12,797	-
-	-	12,747	3,282	-	-
-	-	45	-	-	-
383	-	1,126	-	2,378	-
287	-	1,895	-	-	-
-	-	-	-	-	-
-	-	1,048	-	-	-
670	-	16,861	3,282	2,378	-
10,986	-	-	-	13,658	-
-	-	-	-	-	-
67,826	76,326	165,550	71,912	63,121	32,540
2,687	4,127	12,808	2,711	1,931	1,301
1,588	1,084	2,893	1,286	2,532	-
504	-	3,157	614	325	-
4,779	5,211	18,858	4,611	4,788	1,301

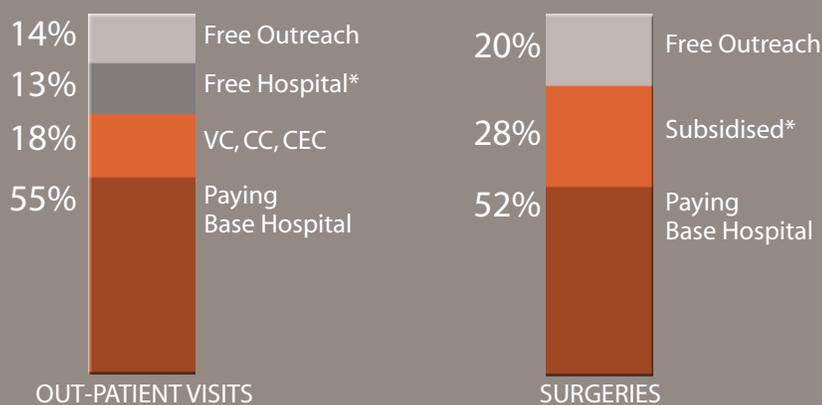
Changing Scenario

Aravind model of eye care delivery is famed for its unique business model that ensures self-sustainability of the system in spite of offering its services free or at a highly subsidised rate to over half of its patients. When the hospital began, only 30% of the patients actually paid for the services and yet it remained financially sustainable. Over the years, the ratio of paying patients crept up to 40% and now at 50%, half of Aravind's patients pay for the services. This is not on account of any restrictions on free care to outreach patients or subsidised care to the walk-in patients in the free hospital. This shift towards paying services can be attributed to the following:

- The general growth in the economy and paying capacity of the patients.
- The hospital fees have remained static over the past several years and thus the paying section is possibly becoming affordable to an increasing proportion of the population.
- The government health insurance scheme for the poor, pays for several non-cataract procedures. So, more patients from the "free" strata are now accessing care as paying patients. The subspecialty surgeries have thus gone up significantly and they have become predominantly paying.

In addition, there has been a positive change in the health-seeking behaviour of general public. Patients have started proactively coming in for treatment. This is substantiated by the steep growth in the direct free walk-ins – both out-patient visits and surgeries, in relation to eye camps.

Out-patient Visits and Surgeries: April 2016 - March 2017



* walk-ins to free hospital

VC-Vision Centre CC-City Centre CEC-Community Eye Clinics

Surgery Details: April 2016 - March 2017

	Total	Madurai	Theni	Tirunelveli	Coimbatore	Pondicherry
Cataract surgeries	286,013	105,579	10,683	35,520	59,017	46,558
Trab and combined procedures	6,424	1,971	97	1,405	1,706	961
Retina and Vitreous surgery	13,739	5,191	11	1,404	4,300	2,372
Squint correction	2,449	1,094	-	341	736	278
Keratoplasty	2,425	821	-	407	778	369
Pterygium surgery	6,578	2,469	268	533	1,543	1,108
Ocular injuries	1,800	507	4	264	532	396
Lacrimal surgeries	5,632	2,612	76	687	933	1,186
Orbit and Oculoplasty surgeries	7,350	2,912	195	1,115	1,895	821
Refractive laser procedures	5,347	2,493	-	781	875	1,069
Retinal laser procedures	42,638	12,432	447	8,692	10,471	8,833
YAG laser procedures	51,364	17,995	1,843	8,341	12,180	5,349
Intravitreal injections (Anti VEGF and Steroids)	18,998	7,356	-	2,613	4,772	3,430
Other surgeries, Laser procedures and Injections	12,367	3,388	53	1,430	3,329	3,749
Total Surgeries	463,124	166,820	13,677	63,533	103,067	76,479

Major Events, Projects

Aravind-Madurai, in 2016, successfully completed the pre-entry-level assessment of NABH certification, which ensures the quality of patient care and safety. Over the past six years, the hospital has taken elaborate efforts to standardise systems, procedures and policies; document all the processes and to adhere to stringent standards of quality care and safety, as stipulated by the Quality Council of India.

Under the 'Vision for All' project, Aravind-Theni has started screening for Retinopathy of Prematurity (ROP), in association with the Government Hospital, Cumbum, since February 2017. Several programmes were conducted to raise awareness about ROP screening amongst doctors and nurses. Posters and pamphlets on ROP were displayed in NICU wards in the Government Hospital. Aravind-Theni screened a total of eight babies and referred two of them with advanced stage of the disease, to Aravind-Madurai for further evaluation and treatment.

Supported by the Queen Elizabeth Diamond Jubilee Trust (QEDJT), the Public Health Foundation of India (PHFI) has introduced a programme to develop integrated services for the detection and treatment of

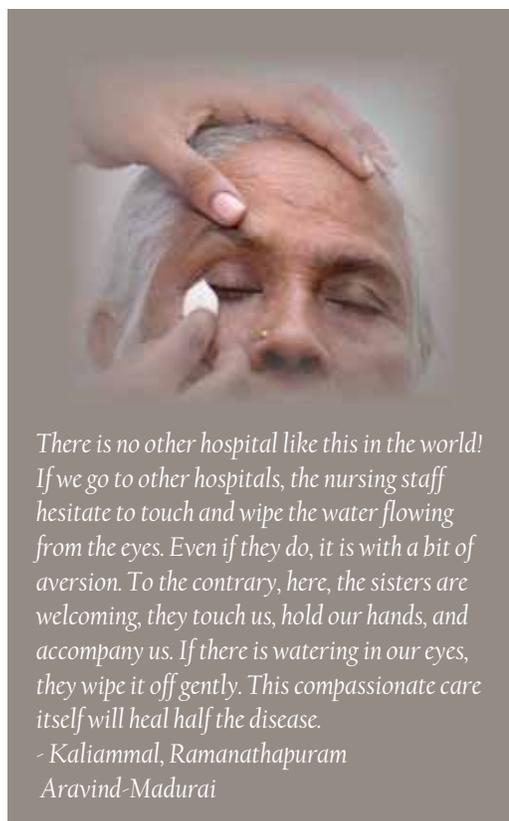
Diabetic Retinopathy (DR) in India. The Government of India has identified 12 states for the programme, and in Tamil Nadu, Aravind-Tirunelveli is the nodal point.

The goal is to achieve reduction in avoidable blindness due to DR through improved control of diabetes, early detection, the treatment of sight-threatening retinopathy with high-quality and affordable treatment, and through increasing awareness among the population. The approach involves establishing models of sustainable and scalable services for the detection

Inauguration of the QEDJT-DR project at Primary Health Centre in Mukkudal



Tirupur	Dindigul	Salem	Tuticorin	Udumalpet	CBE CC
3,829	3,896	12,192	3,580	4,252	907
44	42	119	60	-	19
2	-	458	-	-	1
-	-	-	-	-	-
1	-	48	-	-	1
101	77	409	32	14	24
7	3	84	-	3	-
10	-	121	-	-	7
46	106	121	59	37	43
-	-	129	-	-	-
-	-	1,763	-	-	-
706	1,067	2,319	807	469	288
-	-	827	-	-	-
33	20	268	73	13	11
4,779	5,211	18,858	4,611	4,788	1,301



and treatment of DR, which are integrated into the Government of India's health system at every level. The programme works with state governments, and private eye care and physician partners to screen people with Type 1 and Type 2 diabetes for DR. Aravind-Tirunelveli inaugurated the project in the Primary Health Centre at Mukkudal on November 30, 2016.

Aravind-Coimbatore observed Presbyopia Awareness Week from April 11 to 16, 2016, with an

exhibition and sessions on eye care. On the occasion of World Allergy Week, Aravind-Salem organised an awareness-programme for patients afflicted with vernal keratoconjunctivitis and their family members on April 23, 2017. On World Sight Day (October 13), Aravind-Madurai, in collaboration with the Madurai Ophthalmologists Association, conducted an awareness talk on ophthalmic diseases and the importance of eye care.

Presbyopia Awareness Week at Aravind-Coimbatore



World Allergy Week programme at Aravind-Salem



In order to ensure most accurate diagnoses, quality treatment and patient satisfaction, the speciality clinics invested in latest diagnostic and treatment procedures.

Cataract Services

Aurolab designed square-edge Polymethyl Methacrylate (PMMA) intraocular lens (IOL) in order to reduce Posterior Capsule Opacification (PCO) amongst Small Incision Cataract Surgery (SICS) patients. Through a prospective randomised controlled trial with a follow up of over 9 years, it was found that the square edge IOLs significantly reduced PCO compared to the conventionally used round edge PMMA IOL. Based on this study results and clinical experience, all Aravind Eye Hospitals are now using square edge PMMA IOLs where indicated.

Approximately 60% of Aravind's phacoemulsification patients undergo surgery under topical anaesthesia. The rest 40% and all SICS surgeries were done under retrobulbar or peribulbar block. With these needle techniques, there is a risk of globe perforation. To make anaesthesia safe and comfortable to the patients, the clinic has started administering subtenon's anaesthesia at Aravind-Madurai. This will soon be introduced to all Aravind Eye Hospitals.

To introduce this method, a workshop was conducted at Aravind-Madurai for doctors and theatre nurses from all Aravind Eye Hospitals on November 30, 2016. The workshop included lectures, wetlab training, observation and hands-on training. Following this transition, it is found that the chances of anaesthesia complications have reduced and patients are more comfortable because they do not feel the prick.

The department regularly invests in equipping the surgeons in managing complex cases. A secondary IOL

workshop was arranged for Aravind doctors as part of the Phaco excel CME held at Pondicherry in July.

The ReLOAD (Review Learning on Advancement and Development) Phacoemulsification workshop was conducted at Aravind-Madurai in collaboration with Alcon from March 25-26, 2017. Thirteen doctors from Aravind-Madurai, Tirunelveli, Pondicherry and Coimbatore participated in this workshop which covered both basics and advances in phacoemulsification including complication management. At the hands-on wet lab session, each doctor performed anterior vitrectomy, managed posterior capsule rupture and practised insertion of iris hooks in animal eyes. Similar workshop was arranged for external ophthalmologists from September 24-25, 2016.

A study conducted by the London School of Hygiene and Tropical Medicine, Aravind Eye Hospitals and All India Institute for Medical Sciences, New Delhi found that Indian women who cook with biomass fuels such as wood, crop residues and dried dung instead of cleaner fuels such as gas were nearly 50% more likely to develop cataracts. This research finding was released in a press meet conducted on May 24, 2016 at Aravind-Madurai.

Retina Services

Under the Retinopathy of Prematurity Eradication-Save Our Sight (ROPE-SOS) project, Aravind-Coimbatore has been providing ROP screening services to rural areas via telemedicine. In the last year, a total of 4,897 babies were screened and 1,001 babies were diagnosed to have some form of ROP. Out of this, 87 babies (162 eyes) were treated for blinding ROP. The rest were given other forms of intervention such as Avastin injection, laser

Participants to ReLOAD Phacoemulsification workshop



Waiting area of the renovated Retina Clinic at Aravind-Tirunelveli





Inauguration of DR screening project at PHC in Karikkalampakkam

and vitrectomy. Other findings such as haemorrhages were found in 142 babies, cataract in six babies, of which, five have undergone surgery and one baby is being followed up. Retina Clinic at Aravind-Tirunelveli was renovated to provide better care and comfort to the patients and the new facility was inaugurated on June 22, 2016.

Aravind-Pondicherry introduced opportunistic screening model for Diabetic Retinopathy (DR) in collaboration with Primary Health Centres (PHCs) in Pondicherry. Diabetes patients in the community are asked to visit the PHC on a scheduled day to collect free diabetes medications for the month. The hospital will use this opportunity to screen these patients for DR. The PHC personnel are made aware of the need to screen diabetes patients for DR. A total of 27 primary and 2 community health centres are included. The



With gratitude

Aravind Eye Care System would like to place on record its grateful appreciation to State Bank of India for its generous contribution to purchase Spectralis OCT, an ophthalmic imaging platform.

first DR screening was held at Karikkalampakkam on December 27, 2016.

Paediatric Ophthalmology and Adult Strabismus Services

The department at Coimbatore has launched binocular vision assessment and vision therapy, which help diagnose eye problems associated with accommodation. This is extremely useful in the cases of children above the age of 8 and young adults. Both office-based and home-based exercises using computers are in practice. A total of 80 children have benefited through this therapy during the past 5 months.

Awareness programme on World Sight Day at Mannar Thirumalai Naicker College, Madurai



At Aravind-Madurai, the department has acquired Video NystagmoGram (VNG), to record eye movement to document and differentiate various types of nystagmus. VNG provides ideal conditions for the observation, measurement and analysis of eye movement and is a step forward in the diagnosis and management of nystagmus. It will also act as a base for future research in the field of eye movement disorders. VNG can also be used to track eye movements in children with special needs. The unique design makes it possible for the system to be used with or without a chin rest, making it convenient for use even in infants who otherwise do not co-operate for examination.

Under the aegis of ORBIS Refractive Error Among Children (REACH) Project, the department arranged an eye care-awareness exhibition on the occasion of World Sight Day. Posters on refractive error, optical illumination and ROP were displayed. Around 400 children and their parents visited the exhibition. Dr. P. Vijayalakshmi, Chief, Paediatric Ophthalmology and Adult Strabismus Services, Aravind-Madurai interacted with the public and clarified their doubts on paediatric eye care during the programme aired by All India Radio Madurai Rainbow FM 103.3. At the awareness programme organised in Mannar Thirumalai Naicker College, Madurai, Dr. A.S. Jamuna gave a presentation on paediatric eye problems, symptoms and treatment facilities to a group of about 250 students.

Glaucoma Services

Glaucoma Research Forum has been initiated by Aravind Medical Research Foundation under the mentorship of Dr. VR. Muthukkaruppan, its former Director. Senior clinicians from Glaucoma services are

Fundus evaluation using handheld fundus camera in an eye camp at Aravind-Pondicherry



now participating in regular discussions in an attempt to initiate projects of relevance in clinical management of glaucoma as well as in deciphering molecular mechanisms underlying the disease. Of the projects that have been submitted for possible funding, the proposal on the role of microRNA in regulation of glucocorticoid signalling in Steroid-induced glaucoma and that on characterisation of trabecular meshwork stem cells in pathogenesis of glaucoma have received grant support from funding agencies. A pilot study was conducted to design a web-based glaucoma counselling platform in Tamil to enhance treatment adherence and follow up in persons with glaucoma.

In the clinical management of glaucoma, non-penetrating deep sclerectomy surgery has been introduced for persons with advanced visual field loss, in whom conventional surgery carries higher risk of complications.

Aravind-Pondicherry is conducting a randomised control trial comparing shared medical appointment system with the classic one-on-one type of patient-doctor interaction. Done in collaboration with London Business School and Harvard Business School, this trial will give insights about the patients' and doctors' perceptions on shared medical appointment. If proven successful, this can be implemented for other chronic ocular conditions like diabetic retinopathy. Aravind-Pondicherry has introduced Carbon dioxide Laser assisted sclerectomy surgery, which is a non-penetrating glaucoma surgery, to tackle patients with open angle glaucoma. It has also started a novel outreach model, where fundus evaluation is done with handheld fundus camera, which will help improve screening of not only glaucoma but also all the posterior segment diseases.

Spectralis ASOCT in the Cornea clinic at Aravind-Madurai



Cornea Services

Aravind-Coimbatore started performing Descemet's Membrane Endothelial Keratoplasty (DMEK), an advanced endothelial lamellar keratoplasty procedure, promising better results as compared to the conventional Descemet's Stripping Automated Endothelial Keratoplasty (DSAEK). This is performed on selective patients.

The cornea department at Aravind-Madurai has won a grant of around 2 crores INR, with the help of which it is equipped with the latest imaging facilities - Oculus 5 scan for dry eye and related diseases and Spectralis Anterior Segment Ocular Coherence Tomography (ASOCT) for corneal thickness profile. This grant has made it possible for patients with corneal ulcers who cannot afford the cost of treatment- receive it totally free of cost. Partial support from this grant will also be used to further enhance the quality of indigenously developed corneal preservative medium, Cornisol.

The cornea department at Aravind-Salem received accreditation from the Government of Tamil Nadu to perform corneal transplantation surgeries under the Human Organ Transplant Act.

Orbit, Oculoplasty and Ocular Oncology Services

Retinoblastoma is the most common intraocular tumour among children. Aravind has been treating retinoblastoma cases and found very good results in those who came in at the early stage. Towards identifying the cause of the disease, Aravind's research institute has carried out an analysis of the genes. Newer methods were developed to identify the broad spectrum of mutations present in the RBI gene. Further to make

Participants at the Retinoblastoma Awareness Week celebration at Aravind-Coimbatore



Cancer genetic testing laboratory at Aravind-Madurai

the genetic analysis more efficient, a strategy was made to analyse the gene in a sequential manner. Based on these research findings, a cancer genetic testing laboratory was established at Aravind-Madurai on October 26, 2016 with funding support from Aravind Eye Foundation and Mr. Shyam Prakash Gupta. The centre helps predict the disease in siblings, offspring and secondary tumours in the same patient through the Ring of Hope fund.

To highlight and spread awareness on retinoblastoma, Aravind-Madurai and Aravind-Coimbatore, organised special programmes on the occasion of World Retinoblastoma Awareness Week.

Low Vision Services and Vision Rehabilitation centre

At Aravind-Madurai, digital resource centre was set up to help persons with severe visual impairment lead an independent life. Persons with visual impairment are educated and trained to use computers with the help

Awareness programme on low vision at Aravind-Tirunelveli





A person with special needs being examined at Aravind-Madurai

of special software as well as smart phones with Talk back option. Training is offered for orientation and mobility as well as to use non-optical devices. A total of 10 persons with visual impairment benefited from this in the last year. It has started preparing audio materials for the different school curricula and university syllabi. The centre has introduced Ausion, an innovative mobility device for persons with visual impairment. The effectiveness of this device is being evaluated.

A protocol to perform comprehensive cognitive vision assessment for children with autism is developed. A total of 120 children with autism were examined for both functional and cognitive vision. The clinic is working on standardising this protocol to extend it to all children with special needs. The department has developed a kit for these children to improve their cognitive visual performance.

To build the capacity of the department, Ms. H. Jeyaseeli Flora, Vision Rehabilitationist visited the New Mexico School for the Blind, Albuquerque to observe techniques of vision assessment and intervention. She also visited various institutes in Kansas and observed early intervention and community based rehabilitation programmes for children with disabilities. She also had opportunities to interact with experts in cortical visual impairment disorders and autism. At the Conference of Association for Education and Rehabilitation of the Blind and Visually Impaired held in New Mexico from February 8-10, 2017, she spoke about the vision rehabilitation services offered at Aravind.

Low Vision Services and the Department of Paediatric Ophthalmology jointly organised a half day course at Aravind-Madurai to educate teachers and parents of



Dr. P. Vijayalakshmi addressing the audience at the half-day course for the care givers of children with autism

special children as well as doctors on the importance of vision assessment and intervention in children with autism. The programme included lectures and demonstrations. About 90 persons including teachers and parents of students from Sparks Vidhyalaya, Madurai participated in the course held on November 27, 2016.

February being observed as Low vision awareness month, Aravind-Tirunelveli and Aravind-Madurai conducted exhibitions to create awareness among patients and public about vision rehabilitation services. On March 1, 2017, Aravind-Tirunelveli conducted a similar programme for the teachers of children with special needs from schools under Sarva Shiksha Abhiyan. About 90 teachers attended the programme.

Uvea Services

Uvea Services at Aravind-Madurai, the first dedicated facility of its kind in India, completed 25 years of its service in restoring vision to many. Throughout this journey, treating nearly 60,000 new uveitis patients, the department has brought many laurels to Aravind especially in the area of research and publications. The work done by the team helped in establishing leptospiral uveitis and trematode related uveitis as distinct clinical entities. The department has contributed to developing the next generation of ophthalmologists specialised in uveitis across the country and around the world. As part of the silver jubilee celebrations, a conference titled UVEA 360° was conducted at Aravind-Madurai, which provided a holistic approach towards the diagnosis and management of uveitis.

Aravind Integrated Eye Bank Services (AIEBS)

Aravind Eye Banks play a crucial role in the prevention of corneal blindness by procuring, processing, and preserving corneas and subsequently utilising these for transplantation surgeries. Eye banks at Aravind-Madurai, Coimbatore, Tirunelveli and Pondicherry have been brought under the umbrella term, Aravind Integrated Eye Bank Services (AIEBS).

Dr. M. Srinivasan, Director Emeritus-Aravind Eye Care System was unanimously selected as Director of AIEBS. AIEBS mobilise the community in facilitating eye donation and almost 80% of the eyes received are through community participation.

The centre opened at Kumbakonam for facilitating eye donation process completed two years of excellent service. It conducts several awareness programmes in the community to enhance its reach and motivate the general public to support eye donation. A total of 746 eyes were collected through this centre in the last year. A similar collection centre was opened in Aravind-Salem on October 1, 2016 .

AIEBS collaborates with various hospitals under the Hospital Cornea Retrieval Programme (HCRP). A total of 50 pairs of eyes were received from a donor hospital under the HCRP in February 2017, the highest ever collection from a hospital in a month. Currently, through HCRP, AIEBS works with 11, governmental and private hospitals. In appreciation of their support towards eye donation, AIEBS donated chairs, trolley and fans to various government hospitals to improve patient comfort. AIEBS have joined hands with urban health posts (government-run primary health care

Mr. K. Veera Raghava Rao, IAS, District Collector, Madurai felicitating the family members of eye donors on the occasion of Eye Donation Fortnight celebration



Mr. D. Saravanan receiving the SightLife Award for eye bank facilities in cities) to effectively improve eye donation process. Nurses in these facilities are in close contact with the community and play a great role in spreading the message of eye donation. Training programmes were organised for doctors, nurses and support staff of urban health posts in Madurai with the active participation of the district administration. Following this, staff from these centres help through prompt notifying of deaths to AIEBS.

Several awareness programmes on eye donation were organised on various occasions in educational institutions, industries and hospitals. Social media was effectively used in taking the message to the community. Tissues collected by AIEBS were shared with other hospitals on request. Training in eye banking was provided to three eye bank technicians, a counsellor and an ophthalmologist.

SightLife Awards for AIEBS

It was a proud moment for Rotary Aravind International Eye Bank at Aravind-Madurai when it received the Governance and Strategic Direction Award at the Annual Meeting of SightLife held in New Delhi on March 4, 2017. Aravind-IOB Eye Bank Coimbatore received the award for Excellence in Eye Banking. AIEBS observed 31st National Eye Donation Fortnight between 25th August and 8th September, 2016 with awareness rallies, talks and exhibitions.

Statistics 2016 - 2017

Particulars	Eyes collected	Eyes utilised
Madurai	2,127	1,210
Coimbatore	1,458	920
Pondicherry	1,269	361
Tirunelveli	502	301
Total	5,356	2,792

Eye Donation Fortnight



Aravind-Madurai



Aravind-Theni



Aravind-Pondicherry



Aravind-Tirunelveli



Aravind-Coimbatore

COMMUNITY OUTREACH

Screening eye camps have been an integral part of Aravind since inception. Over the years, the structured way of organising camps has resulted in Aravind developing a well-defined outreach system, which now conducts 50 camps a week with the help of a vast network of sponsors and organisers. In 2016-17, Aravind conducted 2,522 camps in the community, workplaces and schools, through which it screened 577,350 patients; of these, 92,022 underwent surgery.

Aravind realises that its strength is not just about being responsible for those who come to the hospital but also about exhibiting the same responsibility towards those who need to but are not seeking care.





Release of Community Outreach Manual during October Summit

Community participation is very essential for running eye camps in a sustainable manner. The community partners act as a bridge for the community to access eye care services. To acknowledge the support of these partners and social service organisations, Aravind organises *Sponsors' Day* in its various centres once every two years. In 2016, Aravind's base hospitals in Madurai, Coimbatore, Tirunelveli and Pondicherry celebrated Sponsors' Day.

Sharing knowledge and best practices has always been a core activity at Aravind. Efforts spanning a decade came to fruition on October 1, 2016, when Aravind released a manual, titled *Reaching the Unreached: Community Eye Care Outreach in Developing Nations*. The manual exhaustively details the various aspects to be considered to ensure the success of outreach initiatives



in eye care. Mr. R. Meenakshi Sundaram, Senior Manager-Community Outreach, AECS, contributed the chapters to the manual. Seva volunteers, including Ms. Julie Johnston and the Aravind Communications team, helped with the proof reading and editing. Dr. G. Natchiar, Director Emeritus-AECS, released the manual. Dr. R. Pararajasegaram and Dr. Suzanne Gilbert received the first copies.

Annual Meet on Outreach Planning

Aravind's outreach teams across the centres meet every year to review the performance and share best practices, so as to improve the services to benefit many more in the community. Aravind-Coimbatore hosted the annual meeting in January 2017.

Awareness Creation

Lions Clubs have always been supporting Aravind in its various blindness-prevention activities. Every year, Aravind conducts eye care-awareness sessions - SightFirst Seminar - for the new office bearers of Lions Clubs. On August 14, 2016, Aravind-Madurai conducted the SightFirst seminar for the team of President, Secretary and Treasurer of Lions District 324-B3. Similarly, Aravind-Pondicherry and Aravind-Coimbatore conducted seminars for new office bearers of other Lions Clubs on August 28 and September 11, 2016, respectively.

Aravind has been organising school children screening camps to identify cases with refractive errors and other eye problems. With a view to ensuring teachers' support to the initiative, Aravind, in 2016 organised an eye care-

Annual planning meet of the Outreach team held at Aravind-Coimbatore





Dr. R. Venkatesh addressing the participants of SightFirst Seminar at Aravind-Pondicherry

awareness programme for Government/Government-aided school headmasters in Tirunelveli. About 160 person attended the programme, which mainly covered common eye diseases in children.

As a way of reaching out to the general public, Aravind arranged awareness programmes in the forms of rallies, talks and exhibitions on the occasions of World Diabetes Day, World Glaucoma Week and World Sight Day.

Vision Centres

The Aravind model of primary eye care delivery has been well-acclaimed in many fora, and this model is increasingly being sought-after by eye care providers in India and other countries. In the year ending March 2017, close to 200 visitors from various organisations

visited the Aravind vision centres to know more about its operational model; some of the significant teams included senior officers from the Institute of Secretariat Training and Management (ISTM), Government of India, New Delhi; TOMS a for-profit company based in the United States; Kewa Pueblo Health Corporation (KPHC), New Mexico, USA; and Operation Eye Sight Universal, Canada. Various states in India, such as Chhattisgarh, Jharkhand and Uttar Pradesh are in the process of replicating the Aravind model. BRAC, one of the largest NGOs in the world, operating out of Bangladesh has replicated the model in three locations and has made a commitment to reach out to one million people by 2018.

Peopled by ophthalmic technicians, Aravind vision centres are able to reach 40% of the community in the first year, rising to 75% in the following year, and are equipped to resolve 91% of the problems locally. In the last financial year, vision centres were opened at Sivagiri (April 24), Tiruvannainellur (June 3), Kuniyamuthur (October 28) and Sithayankottai (November 25).

In 2016-17, the vision centres handled a total of 524,269 outpatient visits.

In addition to providing eye care services, the vision centres proactively involve in eye care-awareness programmes by organising camps on different occasions and for targeted communities.

Aravind has regularly arranged Continuing Medical Education (CME) programmes to update vision centre technicians on the latest developments in the field and, thereby, improve the quality of care.

Dr. R. Ramakrishnan addressing the school headmasters at Aravind-Tirunelveli



Vision Centres inaugurated
from April 2016 to March 2017



Sithayankottai



Sivagiri



Kuniamuthur



Tiruvannainellur

Sponsors' Day



Aravind-Madurai



Aravind-Pondicherry



Aravind-Coimbatore



Aravind-Tirunelveli

World Glaucoma Week



Aravind-Pondicherry



Aravind-Theni

World Diabetes Day



Aravind-Tirunelveli



Aravind-Salem

Eye care awareness programme and camp organised by vision centres...



.. at Tiruppuvanam



.. at Alanganallur

Outreach Performance April 2016 - March 2017

	Total	Madurai	Theni	Tirunelveli	Coimbatore	Pondicherry	Tirupur	Salem	Tuticorin	Udumalpet	CBE CC
SCREENING CAMPS											
Comprehensive Eye Camps											
Camps	1,530	369	110	276	363	279	-	110	23	-	-
Patients examined	337,671	94,955	16,205	45,727	87,952	76,803	-	12,747	3,282	-	-
Glasses prescribed	74,449	18,468	3,562	11,280	17,011	20,964	-	2,686	478	-	-
Glasses delivered	60,584	15,405	3,292	9,290	13,286	16,579	-	2,307	425	-	-
Patients operated	92,022	32,096	2,964	10,249	22,429	19,684	504	3,157	614	325	-
Diabetic Retinopathy Screening Camps											
Camps	309	57	71	32	83	65	-	1	-	-	-
Patients examined	32,703	10,503	2,553	1,879	10,652	7,071	-	45	-	-	-
Diabetics screened	16,851	4,518	2,477	1,530	4,524	3,772	-	30	-	-	-
DR Patients screened	1,771	380	276	244	565	303	-	3	-	-	-
Refraction Camps											
Camps	239	47	18	62	33	57	5	7	-	10	-
Patients examined	52,345	10,826	3,884	12,723	10,230	10,795	383	1,126	-	2,378	-
Glasses prescribed	19,057	4,294	1,701	5,111	3,524	3,729	42	307	-	349	-
Glasses delivered	15,812	3,907	1,552	4,348	2,906	2,551	35	279	-	234	-
On the spot deliveries	11,259	2,890	1,202	3,513	1,666	1,898	-	90	-	-	-
Refraction Camps by Mobile Unit											
Camps	77	-	-	-	64	-	-	13	-	-	-
Patients examined	17,759	-	-	-	16,711	-	-	1,048	-	-	-
Glasses prescribed	2,850	-	-	-	2,675	-	-	175	-	-	-
Glasses delivered	1,973	-	-	-	1,830	-	-	143	-	-	-
Eye Screening of School Children-Base Hospital											
Schools served	179	10	18	51	51	26	5	18	-	-	-
Camps	176	5	18	51	49	31	5	17	-	-	-
Teachers trained	1,650	146	133	713	4	654	-	-	-	-	-
Total children in school	245,582	17,333	26,341	82,638	41,291	51,839	1,476	24,664	-	-	-
Children screened by ophthalmologist	54,250	1,291	2,271	5,498	34,199	8,809	287	1,895	-	-	-
Children received glasses	7,965	493	1,081	2,108	1,539	1,930	17	797	-	-	-
Children id. with eye defects other than RE*	2,504	54	258	584	638	765	4	201	-	-	-
Eye Screening of School Children-Vision Centres											
Schools served	3	3	-	-	-	-	-	-	-	-	-
Camps	2	2	-	-	-	-	-	-	-	-	-
Teachers trained	2	2	-	-	-	-	-	-	-	-	-
Total children in school	2,383	2,383	-	-	-	-	-	-	-	-	-
Children screened by ophthalmologist	280	280	-	-	-	-	-	-	-	-	-
Children received glasses	66	66	-	-	-	-	-	-	-	-	-
Children id. with eye defects other than RE*	47	47	-	-	-	-	-	-	-	-	-
School Children Screening Camps-Projects											
School served	403	403	-	-	-	-	-	-	-	-	-
Camps	59	59	-	-	-	-	-	-	-	-	-
Teachers trained	-	-	-	-	-	-	-	-	-	-	-
Total children in school	76,131	76,131	-	-	-	-	-	-	-	-	-
Children screened by ophthalmologist	6,917	6,917	-	-	-	-	-	-	-	-	-
Children received glasses	2,587	2,587	-	-	-	-	-	-	-	-	-
Children id. with eye defects other than RE*	462	462	-	-	-	-	-	-	-	-	-
Paediatric Eye Screening Camps											
Camps	130	-	3	6	6	115	-	-	-	-	-
Children examined	75,425	-	1,110	1,669	827	71,819	-	-	-	-	-
Refractive errors	1,762	-	78	221	31	1,432	-	-	-	-	-
Glasses prescribed	836	-	3	-	19	814	-	-	-	-	-
Glasses delivered	827	-	3	-	10	814	-	-	-	-	-
Other defects identified	1,028	-	18	50	40	920	-	-	-	-	-
VISION CENTRES											
Centres	61	25	7	11	5	9	2	-	-	2	-
New + Review	524,269	217,272	61,607	116,287	41,230	63,229	10,986	-	-	13,658	-
Out-patients / day	28	29	28	34	30	23	18	-	-	22	-
COMMUNITY EYE CLINICS AND CITY CENTRES											
Centres	6	3	1	1	-	1	-	-	-	-	-
New + Review	193,613	107,754	22,883	31,954	-	31,022	-	-	-	-	-
Outpatients / day	104	116	74	103	-	100	-	-	-	-	-

*Refractive Error

EDUCATION AND TRAINING

Over the years, Aravind has increasingly refined its teaching facilities, course structure and methodologies to attract the country's best students. Today, it is one of India's most esteemed training institutes for ophthalmology. Since 2016, Aravind-Salem has been allotted four DNB seats. In the last year, 51 doctors completed postgraduation in ophthalmology, 126 ophthalmologists completed long-term fellowships and 173 completed short-term fellowships in the various sub-specialities in ophthalmology. A total of 237 people received training in various areas of eye care management, and 35 people underwent training in various ophthalmic technician courses.

Apart from this, nine conferences were conducted as CME for ophthalmologists at various Aravind facilities. A total of 93 articles were published in peer-reviewed journals.

Ophthalmologists travelled far and wide to present scientific papers, posters and videos at various workshops and courses in India and around the world. Seven Aravind Medical Officers went to premier eye institutes in the United States to gain exposure in their areas of clinical interest.

We are the sum of our decisions. I shall always be glad that I chose to spend two very important years of my life at Aravind-Tirunelveli. I did not just receive an education there that would carve my career, but I learnt a number of very important life lessons, which have helped me evolve as an individual, too.

*- Dr. Meghana
Tanwar, DNB student in
Ophthalmology, Aravind-
Tirunelveli*



Candidates Trained 2016-17

Total Candidates: 622

POSTGRADUATE COURSES

Diploma in Ophthalmology (2 years)	7
Master of Surgery in Ophthalmology (3 years)	13
Diplomate of the National Board (3 years)	15
Post DO DNB (2 years)	16

LONG-TERM OPHTHALMOLOGY FELLOWSHIP

Anterior Segment / Intraocular Lens Microsurgery (2 years)	13
Orbit & Oculoplasty (18 months)	10
Paediatric Ophthalmology and Strabismus (18 months)	13
Glaucoma (2 years)	16
Retina Vitreous (2 years)	24
Cornea (18 months)	23
Comprehensive Ophthalmology (2 years)	4
Fellowship in General Ophthalmology	22
Fellowship in Uvea (18 months)	1

SHORT-TERM CLINICAL COURSES FOR OPHTHALMOLOGISTS

Small Incision Cataract Surgery (1 month)	33
Clinical Observership Programme in Diagnosis and Management of Glaucoma (1 month)	36
Lasers in Diabetic Retinopathy Management (2 months)	51
Vitrectomy (Virtual) (2 weeks)	1
Management of Retinopathy of Prematurity and Paediatric Retinal Disorders (1 month)	7
Orientation to Paediatric Ocular Anaesthesia for Anaesthetists (1 month)	1
Neuro-Ophthalmology (3 months)	2
Phacoemulsification	42

SHORT-TERM PARAMEDICAL COURSES

Optical Dispensing (3 months)	6
OT Techniques (2 months)	4
Refraction Techniques (2 months)	8
Orthoptist (6 months)	5
Ocularist (3 weeks)	8
Fundus Fluorescein Angiography and Ultrasonography (2 months)	4

MANAGEMENT COURSES

Management Priorities in Eye Care Delivery (1 week)	42
Management Training and Systems Development for Hospital Administrators / Managers (4 weeks)	17
Project Management training for Eye Care (2 weeks)	5
Eyexcel - Expanding Global Eye Care Workforce through Excellence in Training (4 days)	31
Research Methodology (5 days)	56
Medical Records Management (2 weeks)	1
Management Training for Eye Care Programme Managers (2 weeks)	29
Fellowship in Eye Hospital Management	7
Community Outreach and Social Marketing of Eye Care Services (3 weeks)	20
Instrument Maintenance - for Technicians (4 weeks)	28
Training in Eye Bank Techniques (1 month)	1



CMEs and Training Programmes held at Aravind

Course on Instruments Care and Maintenance in an Eye Hospital

Aravind-Salem, May 27-29, 2016

Twenty-four participants from eight different hospitals in and around Salem, Karur and Namakkal districts attended the course. The team serviced more than 40 ophthalmic equipment and instruments brought by the participants to the workshop.

CME on Infectious Uveitis

Aravind-Salem, June 19, 2016

The CME was organised in association with the Uveitis Society of India and the Salem Ophthalmic Association. A total of 62 participants attended the CME. Apart from Aravind faculty, Dr. S. Sudharshan, and Dr. Parthapratim Majumder, Medical Consultants, Uvea Clinic, Sankara Netralaya, Chennai handled the sessions.

Update on Neuro-Ophthalmology (UNO-2016)

Aravind-Coimbatore, July 30-31, 2016

The seventh update aimed at orienting the participants to the slowly changing trend of visual debilitation. A dry lab session was held in the hospital premises on July 29, 2016, which attracted more than 180 doctors. Dr. D. Chandrasekhar, Medical Officer, Aravind-Coimbatore and Dr. N. Siddharth, Medical Officer, Aravind-Udumalpet conducted a quiz. A total of 330 participants attended the update. In addition to Aravind and national faculty, international faculty, including



Course on Instruments care and maintenance, Aravind-Salem

Dr. Karl Golnik, Professor of Neuro-Ophthalmology, Cincinnati Eye Institute, USA; Dr. Prem Subramanian, Professor and Division Head, Neuro-Ophthalmology, University of Colorado School of Medicine, USA and Dr. Peter Macintosh, Assistant Professor of Neuro-Ophthalmology and Oculoplasty, Illinois Eye and Ear Infirmary, Chicago, USA, handled the sessions.

PG Refresher Course in Ophthalmology

Aravind-Madurai, September 1-3, 2016

Aravind-Madurai hosted the three-day South Zone Refresher Course, organised by the Academic Research Committee of the All India Ophthalmological Society (ARC-AIOS), with support from Sun Pharma. The faculty comprised doctors from Aravind Eye Hospitals, Sankara Nethralaya, Chennai; Arasan Eye Hospital, Erode and Centre for Sight, Hyderabad. A total of 175 exam-going postgraduates from Tamil Nadu, Kerala and

Seventh Update on Neuro-Ophthalmology (UNO-2016) at Aravind-Coimbatore





Dr. K.G. Srinivasan at the AIOS-Sun Pharma PG Refresher Course in Ophthalmology

Andhra Pradesh participated in the course. Interactive brainstorming sessions were conducted with a focus on enhancing the participants' skills in all the sub-specialties of ophthalmology.

CME on Low Vision Aids

Aravind-Salem, September 11, 2016

The CME aimed to update knowledge of personnel working in the field of low vision and rehabilitation. The faculty included Dr. B. Manohar Babu, Chief Medical Officer, Aravind-Salem; Dr. Sandra Ganesh, Medical Consultant, Paediatric Ophthalmology and Adult Strabismus Services, Aravind-Coimbatore; Dr. A. Fathima, Medical Consultant, Cataract Services, Aravind-Tirunelveli and Dr. K. Ilango, the then Chief, Vision Rehabilitation Services, Aravind-Madurai, and Ms. H. Jeyaseeli Flora, Vision Rehabilitationist Aravind-Madurai. Dr. Tanuja Britto, Senior Medical Consultant, Low Vision Services, Joseph Eye Hospital, Trichy was the guest faculty. Hands-on sessions were

CME on Low Vision Aids, Aravind-Salem



organised as part of the CME. A total of 95 participants from Tamil Nadu, Kerala and Karnataka attended the CME.

Phaco Excel 2016

Aravind-Pondicherry, November 12-13, 2016

Cataract surgery is rapidly developing and new phacoemulsification has transformed it into refractive surgery, which is now in common practice around the world. With the advancement in phaco machines and technologies, revolutions have been experienced in this field. Phaco Excel 2016, with its all-inclusive, integrated emphasis on advanced surgical techniques, aimed to help practising ophthalmologists and transitioning surgeons alike in both understanding and optimising phaco technology. The CME included scientific sessions, workshops and live surgery. A total of 280 participants attended the CME. Resource persons included Dr. Ehud Assia, Medical Director, Meir Medical Center, Ein-Tal Eye Center, Israel; Dr. Gabor Scharioth, Senior Consultant, Aurelios Augenzentrum, Recklinghausen, Germany and Dr. Lisa Park, Associate Professor, New York University School of Medicine. It also included faculty from various Aravind Eye Hospitals and other eye care facilities in the country.

Workshops on Sterilisation and Aseptic Techniques

Aravind-Madurai

Aravind-Madurai, along with the Tamil Nadu State Blindness Control Society and National Health Mission organised the workshop for staff nurses and theatre assistants working in ophthalmic operation theatres in the government hospitals of Tamil Nadu. This five-day residential workshop was conducted in three batches (December 2-7, and 16-21, 2016 and January 6-11, 2017)

Participants to Phaco Excel 2016 at Aravind-Pondicherry





Dr. S.R. Rathinam addressing the audience at Uvea 360°



consisting a total of 68 participants. Topics covered included cataract surgery protocols, aseptic protocols, operation theatre work flow, OT cleaning and infection control. A similar workshop was conducted for District Programme officers on February 3, 2017 with the main focus on prevention of endophthalmitis.

Uvea 360° - A Holistic Approach to Uveitis

Aravind-Madurai, January 28-29, 2017

The CME was organised on the occasion of the Uvea Department at Aravind completing 25 years of service. The distinguished faculty comprised Professor Narsing A Rao, Professor of Ophthalmology and Pathology, University of Southern California, USA; Professor Emmett T. Cunningham, Director of the Uveitis Service, California Pacific Medical Center, USA and Dr. Edoardo Bagalivo from Switzerland. In addition to 14 Aravind faculty, experts from Sankara Nethralaya, Chennai; L.V. Prasad Eye Institute, Hyderabad and Bhubaneswar; Postgraduate Institute of Medical

Education and Research, Chandigarh; Vasan Eye Hospital, Vijayawada; Kasturba Medical College, Manipal and Prabha Eye Clinic, Bengaluru shared their valuable experiences. Further, Dr. Arul Rajamurugan, Rheumatologist from Government Rajaji Hospital, Madurai and Dr. K.G. Srinivasan from K.G.S. MR and CT Scans, Madurai, shared their vast knowledge on the subject. A total of 155 delegates attended the CME.

Update on Cornea Disorders

Aravind-Salem, March 25, 2017

The update was handled by Aravind Cornea Consultants Dr. M. Srinivasan, Aravind-Madurai; Dr. R. Revathy, Aravind-Coimbatore; Dr. B. Manohar Babu and Dr. J. Anuja, from Aravind-Salem. A total of 120 participants attended the CME, which consisted of scientific sessions, talks and a quiz programme. An informal get-together of participants with Dr. M. Srinivasan was arranged, where fellows and postgraduate students presented cases to the senior faculty.

Workshops on Sterilisation and Aseptic Techniques for Ophthalmic Operation Theatre at Aravind-Madurai

Inaugural ceremony of Update on Cornea Disorders at Aravind-Salem



Internal Capacity Building

Every year, Aravind sends ophthalmologists to collaborating institutions in the United States, where they can observe clinical procedures specific to their area of expertise under eminent clinicians and implement the learning in their practice at Aravind. Following is the list of doctors who underwent the capacity building programme in 2016.

Dr. P.S. Vivek, Glaucoma Services, Aravind-Madurai

March 23 - May 5, 2016

Dr. P.S. Vivek visited the Glaucoma Department of Moorfields Eye Hospital, London where he had the opportunity to observe various consultants, including Professor Sir Peng Khaw. At Wilmer Eye Institute, Johns Hopkins University, Baltimore, he spent time to observe glaucoma specialists, Dr. Pradeep Y. Ramulu, Dr. Harry Quigley, Dr. David Friedman and Dr. Henry Jampel. He attended their weekly lectures/grand rounds.

Dr. Vivek visited California Pacific Medical Center (CPMC) where he observed glaucoma consultants Dr. Marc Lieberman, Dr. George Tanaka, Dr. Sunita Radhakrishnan, Dr. Terri Pickering and Dr. Jason Bacharach. He also got the opportunity to observe Dr. Robert Stamper, Director, Glaucoma Clinic, University of California, San Francisco (UCSF). He attended the Uveitis grand rounds at CPMC which was chaired by Dr. Cunningham. He attended the ARVO conference in Seattle and presented a poster.

Dr. P.S. Vivek with Dr. Robert Stamper at Wilmer Eye Institute



Dr. Seema Ramakrishnan, Cornea and Refractive Surgery Services, Aravind-Pondicherry

May 11-24, 2016

Dr. Seema Ramakrishnan visited Cornea Clinic at UCSF, where she met Professors in Ophthalmology-Cornea Services, Dr. Thomas M. Lietman and Dr. David Hwang. She also interacted with Dr. Jennifer Rose-Nussbaumer, Assistant Professor, Cornea Services. She also visited Dr. David Chang's facility in Los Altos, California, and at Jules Stein Eye Institute, University of California, Los Angeles (UCLA), she observed under Dr. Anthony Aldave and Dr. Sophie Deng.

Dr. Neelam Pawar, Paediatric Ophthalmology and Adult Strabismus Services, Aravind-Tirunelveli

September 14 - October 18, 2016

Dr. Neelam Pawar was at Jules Stein Eye Institute, UCLA, where she did observership under the guidance of Dr. Joseph Demer, Chief, Paediatric Ophthalmology and Strabismus Division. She had the opportunity to observe his famous functional coil MRI and MRI in high myopic eyes, decompensated esophoria. She had the opportunity to learn some points on his original concept of pulley mechanism in rectus muscle insertion, pulley dimensions in etiology of strabismus as well as on the techniques of adjustable strabismus surgeries in very elderly patients Dr. Neelam spent with Dr. Federico G Velez, Consultant, Department of Paediatric Ophthalmology and Adult Strabismus, and learnt essential tips in paediatric cataract management, intermittent exotropia management and the concept of binocular summation in intermittent exotropia. She interacted with Dr. Sherwin Isenberg, Consultant,

Dr. Seema Ramakrishnan with Dr. Stephen McLeod and Dr. Tom Lietman at UCSF



Department of Paediatric Ophthalmology and Strabismus, who taught her some of the unique examinations in checking lateral versions of movements. Dr. Neelam also spent time with Dr. Kevin Miller, Head, Cataract and Refractive Surgeries, UCLA and was exposed to clinical activities and procedures and substantially learnt about IOL power calculations in post LASIK patients, astigmatism management and Humanoptics artificial iris.

At Wilmer Eye Institute, Dr. Neelam observed under Dr. David Guyton, Chief, Department of Paediatric Ophthalmology and Strabismus and attended his lectures on Optics and Refraction. He shared his experiences on adjustable adult and paediatric strabismus surgeries. She had an opportunity to observe cases of Inverted Browns syndrome, Dragged Fovea Syndrome and unique tests in the field of strabismus.

Dr. V.K. Anuradha, Uvea Services, Aravind-Coimbatore

September 19 - October 18, 2016

Dr. V.K. Anuradha visited Proctor I. Foundation, UCSF and attended the Uveitis Clinics with Dr. Nisha Acharya, Associate Director, and Dr. John A Gonzales, Assistant Professor. She gained an insight into the treatment they follow in cases of Herpetic stromal keratitis and CMV anterior uveitis. She attended the weekly grand rounds and had the privilege of listening to Dr. Srinivas Sadda, Associate Professor of Ophthalmology, Keck School of Medicine, Doheny Eye Institute, University of Southern California.

At Wilmer Eye Institute, Dr. Anuradha attended the Uveitis Clinic with Dr. Jennifer Thorne, Chief, Division of Ocular Immunology. She witnessed a few

cases of Birdshot choroidopathy, which is rare in India. She observed that intravitreal injections, Ozurdex and Lucentis are very commonly administered in the out-patient department. Dr. Anuradha also attended the rounds after the clinic, where all the doctors and the technicians come together to discuss the condition of patients. This offers a chance for identifying patients who are not doing well; get a second opinion from colleagues and plan for a proper follow-up.

She also participated in the investigators meeting of the First line Antimetabolites as Steroid sparing Treatment (FAST) trial held in Chicago.

Dr. R. Jayagayathri, Orbit, Oculoplasty and Ocular Oncology Services, Aravind-Pondicherry

September 26 - October 28, 2016

Dr. R. Jayagayathri visited Bascom Palmer Eye Institute, West Palm Beach, University of Miami, Florida where she observed orbital decompression and fracture repairs. While there, she also learnt the art of oculoplasty photography skills from Dr. Bradford Lee, Consultant Oculoplasty Surgeon.

Later, she visited the Kellogg Eye Center, University of Michigan, Ann Arbor where she observed state-of-the-art technology like Stryker SONOPET and surgeries using 3D navigational technique.

Dr. Jayagayathri also observed Dr. Alon Kahana, Senior Consultant in Oculoplasty, who demonstrated navigational surgeries. She observed Dr. Hakan Demirci, Ocular Oncologist and Oculoplasty Surgeon perform lid reconstruction techniques. She also met Dr. Victor M. Elnor, Specialist in Ocular Pathology and Oculoplasty Surgeon, who emphasised the anatomical basics for being a good surgeon.

Dr. Neelam Pawar with Dr. Sherwin Isenberg at Jules Stein Eye Institute



Dr. R. Jayagayathri with Dr. Brad Lee at Bascom Palmer Eye Institute



Dr. Jayagayathri attended the weekly grand rounds and participated in the International Ophthalmology night there, where she had the opportunity to meet Dr. Alan L. Robin, Associate Professor Ophthalmology and International Health, Johns Hopkins University, Baltimore and Dr. Hugh Taylor, pioneer in Community Ophthalmology, Australia.

Dr. P. Mangala, Cornea Services, Aravind-Coimbatore

September 29 - November 4, 2016

Dr. P. Mangala visited Massachusetts Eye and Ear Infirmary, Boston and observed Dr. Roberto Pineda, Director, Cornea and Refractive Services. She had an opportunity to observe him perform keratoplasty, particularly Descemet's Membrane Endothelial Keratoplasty (DMEK). She also observed various complicated cataract surgeries and secondary IOL procedures.

Dr. Mangala attended the Cornea and Refractive Surgery sub-speciality day at the Annual Meeting of American Academy of Ophthalmology. While there, she also attended two wetlab sessions organised by SightLife, where she got an opportunity to observe live DMEK and endosertor Descemet's Stripping Endothelial Keratoplasty (DSEK) injectors.

At the Illinois Eye and Ear Infirmary, Chicago, Dr. Mangala observed Dr. Elmer Tu, Director, Cornea Services. She also attended clinics with Dr. Joel Sugar, Professor of Ophthalmology, Cornea Services. She saw a number of endothelial keratoplasties. Further, she attended clinics with Dr. Sandeep Jain, Associate Professor, Cornea Services who has carried

out substantial work in Graft Versus Host Disease. Dr. Mangala also observed workup procedures and treatment protocol of patients at the Infirmary.

Later, she visited an eye bank in Chicago, where she observed the preparation of the precut tissues for DMEK and DSEK. Upon request, she handled a session and provided wetlab training on Small Incision Cataract Surgery (SICS) for the postgraduates there.

Dr. Ashok Vardhan, Aravind-Madurai

Dr. Ashok Vardhan spent a year as a clinical research fellow at the Wilmer Eye Institute beginning in September 2015. He was sponsored by Dr. David Friedman and Dr. Pradeep Ramulu for the fellowship and under their guidance he was exposed to various ongoing studies at the Dana Center for Preventive Ophthalmology, Johns Hopkins University. He participated in studies on hypertension amongst patients visiting the glaucoma clinic, and a glaucoma screening project, "STOP GLAUCOMA" for the African Americans. He attended classes on biostatistics at the Bloomberg School of Public Health. Dr. Pradeep Ramulu and Dr. Alan Robin mentored him in writing an Aravind study on systemic disease association in patients with Pseudoexfoliation Syndrome, which will be published in JAMA in April 2017. He also visited the University of IOWA and Kellogg Eye Center and learnt about their research division setup. His one year stint at Wilmer has helped firm Aravind's collaboration with them and equipped him with knowledge on designing studies, reviewing articles and statistical analysis. His aim is to facilitate research activities at Aravind, improving the quality and quantity of research projects.

Dr. P. Mangala with Dr. Roberto Pineda at Massachusetts Eye and Ear Infirmary



Dr. Ashok Vardhan at Wilmer Eye Institute





Commonwealth Eye Health Consortium

The Queen Elizabeth Diamond Jubilee Trust set up a five year programme in 2014 called “*Commonwealth Eye Health Consortium*” (CEHC) with the aim of providing access to sub-specialist training and technology advancements in the field of eye health in many countries across the Commonwealth. Aravind Eye Care System (AECS) is one among the training centres taking a leadership role in this prestigious project and has contributed the maximum number of training. Dr. N. Venkatesh Prajna, Director, Academics, AECS is also a member of the steering committee of the CEHC and coordinates this training across all the Aravind centres. A total of 11 ophthalmologists from Nigeria, Kenya, Tanzania, Malawi and Rwanda have completed various long term fellowship training programmes of one year duration in the fields of Cornea, Retina, Glaucoma, Paediatric Ophthalmology and Orbit. Apart from this, eight other ophthalmologists are undergoing this training programme currently. In addition, ophthalmic technicians have been provided with short-term training programme in Microbiology, Fundus Fluorescein Angiography and Ultrasonography.

Conferences Attended Elsewhere

As conferences provide a better platform for sharing of best practices, learning and networking, staff at Aravind are always encouraged to participate in various fora within the country as well as overseas. Given below is the list of various national and international conferences attended by Aravind doctors, administrators/managers, LAICO faculty and scientists from Aravind Medical Research Foundation during April 2016 - March 2017:

Association for Research in Vision and Ophthalmology (ARVO)

Seattle, USA, May 6-9, 2016

PROFESSOR K. DHARMALINGAM AND MR. NAVEEN LUKE DEMONTE

- *Antifungal defence proteins induced in tear fluid of mycotic keratitis patients: A quantitative proteomics study*

DR. P. SUNDARESAN

- *Identification of six gene variants in Indian primary open angle glaucoma patients*

Dr. P. Sundaresan at US-ARVO



DR. P.S. VIVEK

- Comparison of intra-operative injection of Mitomycin C (MMC) versus conventional sponge-applied MMC during double site phaco-trabeculectomy

DR. HARIPRIYA ARAVIND

- Aravind Pseudoexfoliation (XFS) study 3 year post-operative results".

DR. SIDDHARTH NARENDRAN

- Evaluation of macular and peripapillary choroidal thickness using enhanced depth imaging Spectral Domain Optical Coherence Tomography (SD-OCT) in patients with essential hypertension

DR. R. VENKATESH

- Environmental life cycle assessment and costs of phacoemulsification at Aravind Eye Hospital in Pondicherry, India
- Comparison of new visual disturbances after superior Vs nasal/temporal laser peripheral iridotomy: A prospective randomized trial
- The photographer's learning curve: Image quality over time in non-mydratic fundus photographs taken with a portable camera
- Intraocular pressure reduction following phacoemulsification Vs. manual small incision cataract surgery: A randomised controlled trial

DR. ASHOK VARDHAN

- Systemic diseases associated with ocular pseudoexfoliation (Aravind Pseudoexfoliation study)

DR. MANISH TANDON

- Role of intravenous Methyl Prednisolone in closure of recent post traumatic full thickness macular hole-a case series

He also visited University of British Columbia, Vancouver, Canada as invited faculty and gave talks on:

- Retinopathy of prematurity - different case scenarios and my learning
- Role of intravenous Methyl Prednisolone in Traumatic full thickness macular holes

Aravind team with Dr. David Chang at ASCRS Conference



Annual Conference of American Society of Cataract and Refractive Surgery (ASCRS)

New Orleans, USA, May 6-10, 2016

DR. HARIPRIYA ARAVIND

Instruction courses

- Preparing for surgical missions
- iTrace educational symposium
- Femtosecond laser-assisted cataract surgery: Where are we today?
- Challenging phacoemulsification cases: Combining techniques and technology
- High-volume, high-quality, cost-effective cataract surgery for the developing world

As panelist for the following paper sessions:

- Cataract surgery complications
- Efficacy of intracameral Moxifloxacin endophthalmitis prophylaxis at Aravind Eye Care System
- Aravind Pseudoexfoliation Study: Three year post-operative results
- ECCE/SICS

DR. R. VENKATESH

- IOP lowering after cataract surgery: Randomised trial comparing phacoemulsification and manual small incision cataract surgery
- Femtosecond laser-assisted cataract surgery: Where are we today?
- High-volume, high-quality, cost-effective cataract surgery for the developing world (Instruction course)

Video Presentation

- My second innings with femtosecond laser-assisted cataract surgery
- Eye on emissions: Carbon footprint of cataract surgery in Aravind Eye Hospital
- Traumatic cataract memoirs
- Vacuum-assisted whole-globe holder: New simple and cost-effective device for wetlab training

DR. K. VEENA

Instruction Course

- High-volume, high-quality, cost-effective cataract surgery for the developing world, Basics of SICS
- Seeing the world through new lens-siblings screening to tackle childhood refractive error with sibling motivation card

DR. MOHIDEEN ABDUL KADER

- Safe, simple, cost-effective method for intraocular lens exchange
- He also made an observation visit to Bascom Palmer Eye Institute, Miami, USA.

DR. SEEMA RAMAKRISHNAN

Instruction Course

- High-volume, high-quality, cost-effective cataract surgery for the developing world
- Management of surgically induced astigmatism and conversion
- Vacuum-assisted whole-globe holder: New, simple and cost-effective device for wetlab training (Video presentation)

- Comparison of the effect of Nepafenac 0.1% and Ketorolac Tromethamine 0.4% on post-phacoemulsification macular thickness: Prospective randomised study

DR. SATHYA T RAVILLA

- Visual outcomes in hydrophobic and hydrophilic Toric IOLs - retrospective analysis
- Wetlab training: Being prepared to handle complications during cataract surgery (Film)
- Assuring quality and ensuring efficiency in high-volume settings (Instruction course)

Annual Conference of Vision 2020: The Right to Sight - INDIA

Pune, India, June 4-5, 2016

Dr. R.D. Ravindran, was involved in the design of the overall programme along with the Vision 2020 India committee members.

Ms. K.M. Sashipriya took part in the designing of the leadership track of the conference. Mr. R.D. Thulasiraj and Dr. R.D. Ravindran contributed as speakers in various sessions of the programme.

MR. MOHAMMED GOWTH

- Use of data analysis for improving outreach services

MS. DHIVYA RAMASAMY

- Training Resources for eye care

MR. SANIL JOSEPH

- Effectiveness of telemedicine in identifying diabetic retinopathy cases

Dr. Usha Kim participated in the Vision Technician's meeting held as part of the conference.

Dr. K. Thiruvengadakrishnan, Ms. S. Sunytha, Mr. C. Gnanasekaran, Mr. N. Vikky Kumar, Mr. N. Vengadesan and Mr. M. Ranjith Kumar participated in the conference.

Dr. P. Namperumalsamy being felicitated at the Tele-e-Health Conference



Dr. R. Venkatesh at NHS Scotland Event

NHS Scotland Event 2016

Glasgow, Scotland, June 13-15, 2016

DR. R. VENKATESH

Keynote address

- Journey of Aravind in developing the organisational approach to quality over the last three decades

Tele-e-Health

Organised by Telemedicine Society of India

Madurai, India, June 19, 2016

Dr. P. Namperumalsamy, delivered the special address on *Telemedicine-Telehealth*

Asia Pacific Tele - Ophthalmology Society

Beijing, China, June 19, 2016

MR. B.S. GANESH BABU

- Aravind's tele-ophthalmology initiatives

Mr. B.S. Ganesh Babu at the Asia Pacific Tele - Ophthalmology Society Meeting





Dr. R. Sharmila and Dr. Ganesh V. Raman at the European Glaucoma Congress in Prague, Czech Republic

European Glaucoma Congress

Prague, Czech Republic, June 19-22, 2016

DR. R. SHARMILA

- Comparison of surgical outcomes of trabeculectomy Vs. phaco-trab in eyes with POAG and PACG

DR. GANESH V. RAMAN

- Changes in central macular thickness and the effect of topical NSAID (Nepafenac) following phacotrabeulectomy

International Diabetes Update 2017

Chennai, India, July 29-31, 2016

DR. R. KIM

- Diabetic retinopathy: The Indian scenario, updates on screening models in India

23rd Annual Meeting of Indian Eye Research Group (IERG) - ARVO India Chapter

Hyderabad, India, July 30-31, 2016

PROFESSOR K. DHARMALINGAM

- Proteomics of eye diseases.
- Proteomics for clinicians.

DR. C. GOWRIPRIYA

- Molecular signature of highly enriched corneal epithelial stem cells

DR. S. SENTHIL KUMARI

- Attenuation of lipofuscin bisretinoids (A2E) accumulation by macular carotenoids in human retinal pigment epithelial cells in vitro

ASWIN BALAJI

- Effects of SB772077B on ROCK expression in human trabecular meshwork cells

T.S. BALAJI

- Assessing the role of RBI mutations in chemo resistance of retinoblastoma

A. DIVYA

- Aspergillus flavus infection induced changes in the proteome of human corneal epithelial cell line (Best Paper Award)



AMRF team at the 23rd Annual Meeting of IERG in Hyderabad

K. KATHIRVEL

- Comparative genome analysis to identify genomic variants and genes associated with drug resistance in ocular Pseudomonas aeruginosa isolates

K. LAVANYA

- Micro-RNA profiling of enriched corneal epithelial stem cells

MADHAVI LATHA YELCHURI

- Investigating the relationship between central Macular Pigment Optical Density (MPOD) and plasma carotenoids in Indian population

K. MANOJ KUMAR

- Comparison of variant calling pipelines for SNVs and InDels in exome data of normal and patient with eye disease

MOHAMMAD HUSSAIN

- Identification of SIX6 gene variants in Indian primary open angle glaucoma patients

S. MOHAMMAD RAZEETH

- Effect of alkaline protease deletion in Aspergillus flavus

KRP. NIRANJANA

- Zinc alpha-2 glycoprotein regulation in Aspergillus flavus keratitis

SANDHYA KRISHNAN

- Understanding the role of complement regulatory protein factor H in tear fluid of mycotic keratitis patients

S. YOGAPRIYA

- Structural and functional integrity of corneal endothelium after storage in cornisol, an indigenous intermediate corneal storage medium

9th International Symposium on Uveitis

Dublin, Ireland, August 18-21, 2016

DR. S.R. RATHINAM

- Trematode Uveitis

DR. B. MANOHAR BABU

- Rickettsial Uveitis



Dr. B. Manohar Babu at the 9th International Symposium on Uveitis, Dublin, Ireland

WCOA 2016 - 4th World Congress of Ophthalmic Anaesthesia

Chennai, India, September 3-4, 2016

DR. R. VENKATESH

- Assuring quality and safety in high-volume cataract surgery

Annual Conference of Ocular Trauma Society of India

Coimbatore, India, September 4-5, 2016

DR. R. KIM

- Traumatic Retinal detachment Management

DR. MANORANJAN DAS

- Management of the co-existent corneal infections and injury
He also shared inputs on the principles of corneal tear management at the Video Assisted Skill Transfer session

DR. USHA KIM

- Orbital and adnexal trauma - Spectrum of orbital foreign bodies and its management (Moderator)

DR. K. NARESH BABU

- Traumatic posterior dislocation of lens / IOL's - Management

Dr. S.R. Rathinam, Dr. V.K. Anuradha and Dr. S. Balamurugan with Dr. Narsing Rao at the FAST Trial Investigators' Meeting



DR. V. MANEKSHA

- Orbital infections

DR. SEEMA RAMAKRISHNAN

- Principles of open globe injury repair

American Academy of Ophthalmology – Asian Society of Continuing Medical Education Summit 2016

New Delhi, India, September 9-11, 2016

DR. N. VENKATESH PRAJNA

- Femto and Microkeratome flaps
- Voriconazole Vs. Natamycin in treatment of fungal keratitis

FAST Trial Investigators' Meeting

Chicago, USA, October 14, 2016

Aravind's Uvea consultants, Dr. S.R. Rathinam, Dr. S. Balamurugan and Dr. V.K. Anuradha attended the First-Line Antimetabolites as Steroid-sparing Treatment (FAST) Trial investigators meeting

Annual Conference of the American Academy of Ophthalmology

Chicago, USA, October 15-18, 2016

DR. RATHINAM SIVAKUMAR

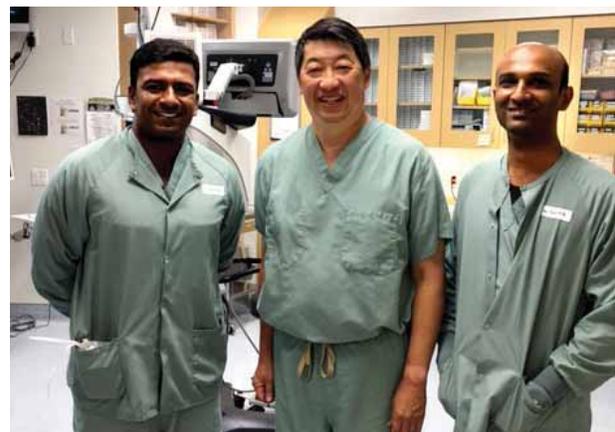
was a panelist at the Uveitis sub-speciality day.

She also visited Casey Eye Institute-Oregon Health and Science University at Portland and had discussions with Dr. James T Rosenbaum, Professor of Ophthalmology, Medicine, and Cell Biology.

DR. NEELAM PAWAR

- Internal aberrations, Strehl Ratio, modulation transfer function, and corneal aspheric function after Femtosecond laser Assisted cataract surgery
- Interocular symmetry of retinal nerve fiber layer and optic nerve head parameters measured by Cirrus HD-OCT in a normal paediatric population

Dr. V.R. Vivekanandan and Dr. Karthik Srinivasan with Dr. David Chang at the AAO Conference



DR. KARTHIK SRINIVASAN
was the invited faculty for Retina sub-specialty session.
DR. V.R. VIVEKANANDAN
took part as instructor in the course on MSICS. He also got an opportunity to observe Dr. David Chang during surgery.

DR. V.K. ANURADHA
attended the instruction course on Paediatric Uveitis led by Dr. Janet Davis.

DR. R. JAYAGAYATHRI
attended the instruction courses and the symposium on Orbit and Oculoplasty.

DR. P. MANGALA
attended the Cornea, and the Refractive Surgery sub-specialty day.

WHO Consultation on Prevention of Vision Impairment from Diabetic Retinopathy (DR)

Geneva, Switzerland, September 21-23, 2016
Dr. R. Kim participated in the consultation.

North Zone Ophthalmic Society and Uttarakhand State Ophthalmic Society meeting

Dehradun, India, October 17-19, 2016

DR. HARIPRIYA ARAVIND

Performed live Femtosecond laser assisted cataract surgery

DR. SHAH HEM

- *Comparative analysis of miRNA expression in infectious Vs non-infectious corneal inflammation.*

Regional Consultation of the WHO Collaborating Centres in South-East Asia Region

New Delhi, India, October 20-21, 2016

Ms. G. Krishnaveni and Dr. Ashok Vardhan participated



Ms. G. Krishnaveni at the Regional consultation of the WHO collaborating centres in South East Asia Region

in the consultation which was organised for strengthening networks between WHO collaboration centres in South East Asia Region. Totally 82 WHO collaboration centres from 11 countries participated in the consultation.

7th Annual Conference of Association of Community Ophthalmologists of India and International Assembly of Community Ophthalmology

Trichy, India, October 21-23, 2016

DR. R. RAMAKRISHNAN

- *Magnitude of glaucoma in India*

10th General Assembly of International Agency for Prevention of Blindness (IAPB)

Durban, South Africa, October 27-30, 2016

DHIVYA RAMASAMY

- *Patient comprehension and its impact on follow-up*

LAICO team at the 10th General Assembly of IAPB



R. KUMARAGURUPARI

- Worldwide research productivity in paediatric eye health: A bibliometric analysis

N. VENGADESAN

- Delayed follow-up in patients with diabetic retinopathy in southern India: Social factors and disease progression

V. VIJAYAKUMAR

- Evaluation of a diabetic retinopathy screening strategy at government primary health centres in southern India

B.S. GANESH BABU

- Eyeinfobase: An innovative approach in building global repository blindness and morbidity data

MOHAMMED GOWTH

- Role of telemedicine-enabled vision centres in enhancing eye care coverage-a retrospective study in a southern Indian district

R. MEENAKSHI SUNDARAM

- Enhancing compliance of referrals from outreach for sub-speciality eye care

SANIL JOSEPH

- Prevalence and risk factors for myopia and hyperopia in an adult population in southern India
- A comparison of post-operative outcomes among patients undergoing day care Vs inpatient surgery for cataract in a south Indian eye hospital

K.M. SASHIPRIYA

- Enhancing eye care delivery through organisational capacity building

All India Oculoplasty Conference

Vadodara, India, October 29 - November 1, 2016

DR. USHA KIM

- Retinoblastoma: Our experience

She also performed live ptosis surgery.

DR. V. MANEKSHA

- Centurion Syndrome

DR. R. PRIYADARSINI

- Adult onset capillary hemangioma of lid

Annual Conference of Glaucoma Society of India

Palampur, Himachal Pradesh, India, November 4-6, 2016

DR. R. RAMAKRISHNAN

- Non penetrating glaucoma surgery - Is it relevant?

He was one of the judges for video festival and one of the panelists for grand rounds.

DR. MOHIDEEN ABDUL KADER

- Surgery in childhood glaucoma - What I would do for its success?

DR. RAVI CHANDRA

- Long-term intraocular pressure (IOP) outcomes in patients undergoing Descemet's stripping endothelial keratoplasty

DR. MANJU R PILLAI

- Generic medications are great and cost-effective for India

DR. S.R. KRISHNADAS

- Quality of life and medical management

DR. R. VENKATESH

- Glaucoma surgery made easy with CO₂ laser - experience and short-term outcomes
- Opportunistic screening to tackle glaucoma

DR. GEORGE V PUTHURAN

- AADI: Why it should be the implant of choice for India: ease and efficacy

DR. GANESH V RAMAN

- Inferior placement of tube: Indications, technique and outcomes

Strategies to address DR and ROP: L.I.M.E – Challenge

Kolkata, India, November 6, 2016

Lessons in Marketing Excellence (L.I.M.E) is the country's biggest and most keenly contested B-school challenge which is televised on CNBC-TV-18 in

The Aravind Glaucoma team with Dr. Alan Robin at the Annual Conference of GSI





Dr. Renu P. Rajan as a jury member at L.I.M.E Challenge

association with Hindustan Unilever. Dr. Renu P Rajan participated as a jury member for the L.I.M.E Challenge held for the students of Indian Institute of Management, Kolkata. The students were given the challenge of creating strategies to address the problem of Diabetic Retinopathy and Retinopathy of Prematurity.

TEDx Conference

Hosted by IIT Patna, India, November 13, 2016
 Dr. George V Puthuran spoke about the Aravind model of eye care delivery.



Dr. George V Puthuran at TEDx Conference

India Jugaad tour

Bengaluru, India, November 20, 2016
 The Good Governance Institute, UK organised the India Jugaad Tour to expose senior officials in UK's National Health Service to innovative healthcare practices in India. Dr. R. Venkatesh and Ms. Dhivya Ramasamy represented Aravind at the event held in Bengaluru. They facilitated a learning session to discuss the Aravind model and its lessons for the UK's healthcare system.

Dr. R. Venkatesh at the India Jugaad tour



Annual Conference of Vitreo Retinal Society of India

Chandigarh, India, November 30 - December 5, 2016

DR. R. KIM

Convener for the scientific committee

Chairman for the Surgical Retina session on *Code Red* and also in the Awards session

DR. KARTHIK SRINIVASAN

- *Nitinol basket for lens removal*

DR. PRABHU BHASKARAN

- *Autologous free internal limiting membrane transplantation for failed macular closure (Video)*

Joint Congress of American Association for Paediatric Ophthalmology and Strabismus (AAPOS) and Strabismus and Paediatric Ophthalmological Society of India (SPOSI)

Jaipur, India, December 2-4, 2016

DR. P. VIJAYALAKSHMI

- *Childhood visual impairment: Detection, assessment and rehabilitation*

- *Epidemiology of eye disease - birth to three years in a tertiary eye centre in India*

DR. SHASHIKANT SHETTY

- *Orbit trauma*

- *Evaluation of Nystagmus*

DR. A. RUPA

- *Electro retinography as a diagnostic tool in childhood visual impairment*

DR. SATHYA T. RAVILLA

- *Attainment of binocularity following late alignment for early onset strabismus*

- *Paediatric cataract: Are we seeing a changing trend?*

DR. NAVDEEP KAUR

- *Management of head posture in Duane's Retraction Syndrome (DRS) with Nystagmus*



Aravind Alumni Meet at the AAPOS and SPOSI conference

- Intraocular lens power calculation errors for (up to five years) paediatric eyes in Indian population
DR. POOJA KEWLANI
- Outcomes of surgical correction in partially accommodative esotropia
DR. PALLAVI PATIL
- Joubert syndrome with bilateral hypotropia
- Optical iridectomy in children
DR. PALAK MAKWANA
- Functional outcomes of botulinum toxin injection in acute sixth nerve palsy
DR. SHRUTI AGARWAL
- Ocular Trauma Score (OTS): A valid tool as a prognostic indicator in paediatric traumatic cataract
DR. SAHITHYA
- A rare case series of high myopia in full term infants
DR. KRUTI SHAH
- Outcomes of surgical management of traumatic bilateral superior oblique palsy
DR. R. MEENAKSHI, DR. NEELAM PAWAR, DR. RUTIKA
- Clinical spectrum and neuroimaging in paediatric optic neuritis: A case series
- Retinal nerve fiber layer thickness and optic disc parameters in anisometropic amblyopia by cirrus HD-OCT in paediatric population
- Optical Aids: A ray of hope for children with low vision in southern India
DR. R. MEENAKSHI
- Study of etiology, clinical features and management of exotropia patients attending strabismus clinic at a tertiary centre
DR. NEELAM PAWAR
- Interocular symmetry of retinal nerve fiber layer and optic nerve head parameters measured by Cirrus HD-OCT in paediatric population
DR. THUSHARA
- Outcome of collagen corneal cross linking for paediatric keratoconus
DR. IFEOMA EZEGWUI
- Glaucoma following childhood cataract surgery
DR. K. SAMYUKTA SADASIVAN
- Interesting case presentation - A case of optic nerve aplasia

Dr. P. Vijayalakshmi at the Sadguru Conclave 2016



Sadguru Conclave 2016

Chitrakoot, Madhya Pradesh, India, December 7-8, 2016

- DR. P. VIJAYALAKSHMI
- Journey 1990-2016.
- Visual rehabilitation of children after cataract surgery
- Convenor for the session on Rehabilitation for children with visual impairment
- Management of strabismus in high myopia

10th Congress of the Asia Pacific Vitreo Retina Society

Bangkok, Thailand, December 8-10, 2016

- DR. VENUGOPAL REDDY
- Neurofibromatosis with bilateral peripheral avascular retina
- DR. RENU P. RAJAN
- Traumatic endophthalmitis: Profile and treatment outcomes



Dr. Manoranjan Das at the 5th Biennial Scientific Meeting of Asia Cornea Society



Dr. Ganesh V. Raman being felicitated at the 7th Annual Conference of the Bangladesh Glaucoma Society

5th Biennial Scientific Meeting of Asia Cornea Society

Seoul, Korea, December 9-11, 2016

DR. N. VENKATESH PRAJNA

- Efficacy of oral voriconazole in severe fungal keratitis

He also participated in the debate titled *Infections: Surgery or Medical treatment*

DR. LALITHA PRAJNA

- Laboratory perspective on best practices in the management of ocular infection

DR. ASHISH KUMAR, DR. N. VENKATESH PRAJNA

- Detection of corneal scars by corneal cellscope, a smartphone camera attachment
- Sclera as a tissue carrier for Aurolab keratoprosthesis performed for peripheral ulcerative keratitis.

DR. MANORANJAN DAS, DR. ASHISH KUMAR

- No bubble, no trouble: Long-term results of optical deep anterior lamellar keratoplasty

7th Annual Conference of the Bangladesh Glaucoma Society

Dhaka, Bangladesh, India, December 15, 2016

DR. GANESH V. RAMAN

- Tips and tricks of managing angle closure disease
- Aurolab Aqueous Drainage Implant (AADI)

Keracon

Lavasa, Maharashtra, December 15-17, 2016

DR. ARUNKUMAR PANIGRAHI

- Role of topical mitomycin in Ocular Surface Squamous Neoplasia (OSSN)
- Corneal intraepithelial neoplasia

Photo contest

- Bee sting
- Confocal image of Acanthamoeba cyst
- Confocal image of fungal hyphae

DR. R. NAVEEN

Photo Contest

- Dendrite
- Posterior polymorphous dystrophy
- Fungal colonization of BCL
- Schiempflug image of Pentacam

DR. NILAM GOHLIL

- Evaluation of drug reservoir function of Human Amniotic Membrane (HAM) for use as medicated membrane for corneal disorders using a model drug - Prednisolone
- Tear protein zinc alpha 2 glycoprotein as species specific bio marker for fungal keratitis

DR. HITHA SARA SAJEEV

- Human amniotic membrane: Biological bandage and drug delivery tool
- A rare combination of Francois and Fuchs dystrophy with true exfoliation
- Corneal OSSN (Photo contest)

DR. LAKSHEY DUDEJA

- Complement factor as a predictor of clinical outcome in *Aspergillus flavus* keratitis patients

Photo contest

- Conjunctival rhinosporidiosis
- Coats ring
- Confocal image of fungal hyphae with 90° branching
- Confocal Image of fungal hyphae with 45° branching

DR. KOMAL MEHTA

- Vision Centres as a means to reduce corneal blindness
- Conjunctival hemangioma (Photo contest)

DR. ROHAN AGASHE

- Microsporidial Keratoconjunctivitis
- Macular corneal dystrophy - Screening for novel mutations in the Carbohydrate Sulfotransferase 6 (CHST6) gene of patients in south Indian population and determination of genotype phenotype correlation



Dr. O.G. Ram Prasad at the Asia ARVO Conference

DR. RAMYA SEETAM RAJU

- *Aspergillus flavus* induced alteration in tear protein profile
- Photo Contest
- Corneal OSSN
- Conjunctival Rhinosporidiosis
- Confocal image of *Acanthamoeba* cyst in chains
- Ophthalmomyiasis

DR. SEEMA RAMAKRISHNAN

- Outcomes of air descemetopexy in post-cataract surgery Descemet's membrane detachment

DR. KUNAL A MANDLIK

- Case series of ocular infections caused by *Scedosporium Apiospermum* - a rare fungus

ASIA-ARVO Conference

Brisbane, Australia, February 4-8, 2017

ALOYSIUS ABRAHAM

- *Effective and comprehensive genetic analysis of retinoblastoma by next generation sequencing*

Dr. O.G. Ramprasad and Mr. Aloysius Abraham participated in the conference. Oral presentation on the collaborative work with University of Liverpool, Development of a novel chemical cross-linker for the treatment of keratoconus was given. Dr. Ramprasad visited the laboratory of Professor Traian Chirila, Chief Scientist, Queensland Eye Institute (QEI) to



Dr. R.D. Ravindran at the APAO Conference

gain knowledge related to the use of silk proteins as biomaterials in ophthalmic tissue engineering.

Mr. Aloysius Abraham presented the poster titled Effective and comprehensive genetic analysis of retinoblastoma by next generation sequencing.

He also gave an invited talk on Efficient genetic testing of retinoblastoma in south Indian population at Centre for Eye Research, Australia and visited Peter MacCallum Cancer Centre, Melbourne.

6th Annual Conference of the Society for Mitochondrial Research and Medicine (SMRM)

New Delhi, India, February 10-11, 2017

DR. P. SUNDARESAN

- *Mitoscryptome analysis to understand Diabetic Retinopathy.*

Asia-Pacific Academy of Ophthalmology (APAO)

Singapore, March 1-5, 2017

DR. USHA KIM

- *The severe lower lid ectropion*

DR. P. SUNDARESAN

- *Multiplex cytokine analysis in the aqueous humor of patients with primary angle closure glaucoma*

DR. MANORANJAN DAS

- *Combined Penetrating Keratoplasty (PKP) with sutureless glueless Scleral Fixation IOL (SFIOL) : A novel technique*

Dr. R.D. Ravindran participated in the conference.

Articles Published in Peer-reviewed Journals

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CONSULTANCY AND CAPACITY BUILDING

Since 1993, LAICO has collaborated with eye hospitals and institutions around the world to build sustainable eye care programmes through a structured mentoring process using the Aravind model. The services are designed for existing eye hospitals, new hospitals and hospital start-ups, and for increasing sub-specialities. LAICO's capacity-building process, when internalised, helps eye hospitals to improve their performance through efficient use of available resources, develop a forward-thinking approach, solve major organisational growth problems, mobilise required resources and to become financially viable.

In the year-ending March 2017, LAICO entered into collaboration with 15 hospitals, thus taking the total number of partners to 335.

This workshop was excellent and highly educating... For our group it was very good, especially for my staff. Being born and brought up in small villages, they have absolutely no exposure to the outside world and sometimes develop an ego of performing the best. This kind of workshop opens up their horizon and bring them to reality, where we stand.

- a Community Outreach Course participant



LAICO's work with other eye care organisations is carried out in partnership with NGOs, such as Hilton Foundation, Seva Foundation, Lions Club and Lavelle Fund for the Blind.

Capacity Building Programmes

Hilton Cataract Initiative (HCI)

LAICO has been collaborating with five hospitals in sub-Saharan Africa as part of the Hilton Cataract Initiative (HCI) to improve the surgical rate of cataract in the region. The project started in 2014 and came to an end in 2016. LAICO teams made follow-up visits to these hospitals in Kenya, Zambia, Nigeria and Ethiopia in the first of week of July 2016. Hilton Foundation recently approved a proposal relating to the second phase of the project, amounting to USD 1.9 million to continue LAICO's support to the five partners for another three years (2017-2019).

Strengthening Capacity and Learning to Effectively Deliver Quality Eye care (SCALE) Project

Supported by *Seeing is Believing*, the corporate social responsibility wing of Standard Chartered Bank, UK, the project was launched in April 2016. Co-ordinated by Seva, the project involves six mentor organisations and 54 mentee eye hospitals. As one of the mentors, LAICO has started collaborating with 13 eye hospitals across the nation. To date, LAICO has conducted two vision-building workshops and eight needs-assessment visits under this project.

So-Hum, Lavelle and Lions Projects

So-Hum Foundation and Lavelle Fund support LAICO in its various capacity building initiatives. In the last



Mr. Seran.I, Mr. S. Poornachandran and Professor K.S. Raj Kumar with the team at City Eye Hospital, Nairobi Kenya

year, eight new hospitals have been supported by the Lavelle Fund and one hospital by the So-Hum Foundation. As part of Manpower Management Development Programme for Lions Eye Hospitals, LAICO has started supporting a hospital in Myanmar.

Review Meetings

To assess the performance of hospitals since LAICO's intervention, review meetings are held at regular intervals with all stake holders. The first onsite review meeting with nine partner hospitals of So-Hum and Lavelle projects was held at Sitapur Eye Hospital, Uttar Pradesh from April 23-24, 2016. The key objective of this onsite meeting was to share with each other on the progress made thus far, challenges faced and successes. It also addressed key areas of concern and developed a plan of action for the following year. A parameter template was prepared to review the performance of each hospital in the areas of direct walk-ins, outreach, quality, patient source, HR productivity, cost recovery,

Participants at the onsite review meeting held at Sitapur Eye Hospital, Uttar Pradesh





Dr. R.D. Ravindran and Mr. Leon Ellwein, a long-term volunteer with the Chinese Eye Hospital Alliance delegation

growth and IHMS usage. Two members from each hospital (CEO/Director and senior ophthalmologist) and LAICO faculty participated in the meeting. Another review meeting for nine partner hospitals in Bangladesh was held at Dr. K. Zaman BNSB Eye Hospital, Mymensingh from June 15-16, 2016. This review meeting included long-term partners of LAICO under various projects apart from the hospitals currently working under So-Hum and Lavelle projects. VMA Netra Niramay Niketan, Chaitanyapur also hosted a review meeting from March 24-25, 2017 involving 14 eye hospitals from India, Nepal and Cambodia. A performance review meeting of all the hospitals under HCI was held at Dubai from July 9-10, 2016.

New Collaborations

For the first time, LAICO partners with Operation Eyesight Universal (OEU) in organising training, consultancy and capacity building programmes for OEU's partners in Africa and South Asia as well as exploring new areas of intervention in these regions. LAICO has entered into a partnership to work with Chinese Eye Hospital Alliance (CEHA). A senior delegation responsible for running a large scale programme on hospital capacity building for the private hospitals in 2nd tier cities and counties in China visited Aravind in the second week of December to investigate the best ways to work with Aravind and Aurolab.

Teaching and Training

Driven by Aravind's vision to eliminate needless blindness, LAICO had set up a range of training activities that help eye care institutions to plan, develop

and strengthen their care delivery programmes with greater vigour and reach.

In the last year, through its nine structured courses, LAICO trained over 200 candidates. Customised training on various operational aspects of vision centres and eye hospitals were also offered on request.

Aurosiksha – Online Portal for Allied Ophthalmic Personnel Training

Aurosiksha is Aravind's online platform that offers training materials to learners and trainers. This unique online portal gives free access to training resources for allied ophthalmic personnel - covering all the basic knowledge and skill-based competencies for outpatient clinical assistance, operating room assistance, ward assistance and refraction.

The available gamut of resources include teaching slides, laboratory experiments, test papers and skill assessment rubrics and scoring sheets. This year, training resources for 41 new competencies were published. Aurosiksha now also carries the Ophthalmic Assistant Training Series and the Training in Eye Care Support Services Series - the eight-book series for Mid-Level Ophthalmic Personnel- now available in electronic format for online reading or downloadable for print.

The portal is also used to conduct real time online tests. In the past year, online assessments were conducted for the Tripura's government vision technicians organised by of Infrastructure Leasing and Financial Services (IL and FS) Education and Technology Services Ltd. In addition, pre-training assessment was also conducted using Aurosiksha for 472 of Aravind's trainees. The portal today, reaches over 2,193 users from 20 countries.

Ms. Hepsibha Jawahar instructing the new tutors / supervisors on the use of Aurosiksha





October
SUMMIT
2016

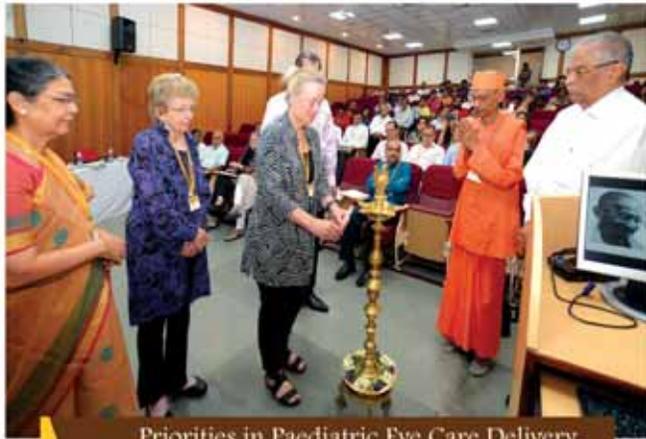
IN HONOUR OF
DR. G. VENKATASWAMY



Enhancing low vision services at AEH
towards better care delivery
OCTOBER 6 - 7, 2016



*Dr. S. Venkataswamy Endowment Creation
and Award Ceremony 2016
Dr Suzanne Gilbert
Saturday the 1st of October, 2016*



Priorities in Paediatric Eye Care Delivery,
Intervention Models and Research
OCTOBER 2 - 3, 2016



Practicing Responsible Medicine
SEPTEMBER 30 - OCTOBER 1, 2016



Mr. R. Suresh Kumar and Mr. Sanil Joseph with the course participants in Cairo, Egypt



Dr. V.R. Vivekanandan at IMO hospital, Queretaro, Mexico

Onsite Training Programmes

Aravind's Instruments Maintenance Department conducted training programmes at:

- Caribbean Council for the Blind and Visually Impaired, Antigua, West Indies (May 9-21, 2016);
- Lions SightFirst Eye Hospital, Nairobi, Kenya (July 11-23, 2016);
- Magrabi Eye Hospital, Cairo, Egypt (November 5-16, 2016);
- Kilimanjaro Centre for Community Ophthalmology, Moshi, Tanzania (March 13-25, 2017);

Dr. V.R. Vivekanandan, Medical Officer, Aravind-Tirupur was in IMO hospital in Queretaro, Mexico during September 28 - October 1, 2016 to train ophthalmologists in MSICS. Training included lectures, wetlab sessions and live surgery.

Mr. Sanil Joseph and Mr. R. Suresh Kumar, Senior Faculty members of LAICO, were the invited faculty at the course on *Management Priorities in Eye Care Delivery* organised by Egypt Institute of Community Ophthalmology (EICO), Magrabi Foundation, Cairo from November 19-25, 2016.

October Summit 2016

Practicing Responsible Medicine

Aravind-Madurai, September 30 - October 1, 2016 While it has made significant strides forward, the current mode of healthcare delivery is by and large eroding the trust and respect for the medical profession. A group of 25 like-minded people from varied backgrounds came together for the meeting sponsored by Seva Foundation in an attempt to address this

grave issue. As an outcome of the meeting, a Forum for Responsible Medicine was formed and this group will take on the issues by working in different verticals such as Value based Education, Policy and Information Bureaucracy etc. Participants included Dr. P. Namperumalsamy, Chairman Emeritus, AECS; Mr. R.D. Thulasiraj, Executive Director, LAICO; Dr. R.D. Ravindran, Chairman, AECS; Dr. G.N. Rao, Founder Chair, L.V. Prasad Eye Institute, Hyderabad; Dr. B. Soma Raju, Chairman and Managing Director, Care Hospitals, Hyderabad; Dr. Damodar Bachani, Ministry of Health and Family Welfare, Government of India, Delhi; Professor Jagdeep Chhokar, Association for Democratic Reforms, Ahmedabad; Professor DVR Seshadri, Faculty, Indian School of Business (ISB), Hyderabad; Dr. Koteswara Rao, United Hospitals, Hyderabad; Dr. Devadasan N, Institute of Public Health, Bengaluru; Professor Sarang Deo, Professor of Operations, ISB, Hyderabad; Dr. Jayaprakash Narayan IAS, Founder - Loksatta Party, Hyderabad; Ms. Rema Nagarajan, Assistant editor, The Times of India, New Delhi; Mr. Vijay Poddar, Sri Aurobindo Society, Pondicherry; Professor T. Sundararaman, Dean, School of Health Systems Studies, Tata Institute of Social Sciences, Mumbai; Dr. Nirmala Murthy, Foundation for Research in Health Systems Bengaluru; Dr. H. Sudarshan, Vivekananda Girijana Kalyana Kendra (VGKK), Bengaluru; Mr. Gopi Gopalakrishnan, President, World Health Partners, New Delhi; Dr. R. Pararajasegaram, Ophthalmologist and former Consultant, WHO; Dr. Suzanne Gilbert, Seva Foundation, USA; Ms. K.M. Sashipriya, Senior Faculty, LAICO and Dr. Devendra Tayade, Manager, Employee Engagement Programme, AECS.

Priorities in Paediatric Eye Care Delivery, Intervention Models and Research

Aravind-Madurai, October 2-3, 2016

Paediatric eye care and childhood blindness is recognised as a global issue. Sponsored by Seva and USAID, this two-day workshop aimed to bring in understanding on various aspects of paediatric vision impairment in the current context and analyse key challenges in paediatric eye care delivery. The workshop brought together experts and organisations sharing their experiences and successful intervention models that will help in evolving actionable next steps towards improving paediatric eye care. The workshop also focused on inherited eye diseases and genetic counselling in low resource settings. Apart from the Aravind faculty, the resource persons included Dr. Marilyn Miller, Ophthalmologist - USA; Dr. Clare Gilbert, Professor International Centre for Eye Health, London and Dr. Linda Lawrence, Paediatric Ophthalmologist, USA.

USAID Partners Meet

Aravind-Madurai, October 4-5, 2016

USAID's Child Blindness Programme (CBP) convened grantees, experts, groups, organisations and stakeholders involved in paediatric eye care from around the world, creating an opportunity to share best practices and lessons learned from each project. State-of-the-art topics and presentations ranged from the use of laser for the treatment of ROP to monitoring and evaluation, provision of low vision devices, and project management. Experts included CBP senior advisors, Drs. Clare Gilbert and Marilyn Miller. A total of 46 persons from 22 partner organisations participated.

Enhancing the Low Vision (LV) Services at AECS towards Better Care Delivery

Aravind-Madurai, October 6-7, 2016

This internal workshop was held for Low Vision Service teams from all Aravind Eye Hospitals to deliberate on the challenges in providing services to persons with low vision, learn about recent updates in the field and evolve strategies for enhancing referral and uptake of services. The teams worked on standardising protocols for service delivery at the primary, secondary and tertiary levels of care. The workshop processes included sharing of experiences / learning from Aravind's existing LV services and projects. A three-member team from each Aravind Eye Hospital including an ophthalmologist,

senior refractionist and nurse from the Paediatric Ophthalmology Department participated.

Preferred Practices in Paediatric Eye Care

Aravind-Madurai, October 6, 2016

The Kilimanjaro Centre for Community Ophthalmology (KCCO) facilitated this two day meeting in collaboration with Seva-Canada and with funding support from Partners for Global Research Development (PGRD) and USAID. KCCO representatives presented the preliminary findings from the case studies on Preferred practices and engaged partners from different countries to learn more about their strategies to improve the reach scope and quality of paediatric programmes. A total of 19 participants attended the meeting. Mr. Sanil Joseph and Ms. A. Priya, Manager, Paediatric Ophthalmology and Adult Strabismus Services, Aravind-Pondicherry represented Aravind.

Projects

REACH

Aravind-Madurai and ORBIS International introduced the project titled *Refractive Error Among Children* (REACH) to reach school going children in the age group of 6-17 years. The project, aims to reach at least 400,000 school going children during the next three years starting from July 2016 and screen them for vision problems.

The project implementation areas include four districts (Sivagangai, Ramanathapuram, Madurai-Rural and Virudhunagar) of Tamil Nadu. Apart from addressing the problem of uncorrected refractive errors, the project aims to provide tertiary eye care services free of cost to children identified with vision

Vision for All Project : A technician capturing fundus image





REACH Project: Dr. P. Vijayalakshmi interacting with school children



At the camp organised as part of the project

problems. It also plans to create awareness towards increasing spectacles compliance by educating the target population - parents, teachers and children. This will help create a wider database to facilitate clinical research.

Trained vision screeners did primary screening for 76,131 students from 403 schools through 59 camps. Around 8,500 (11%) students were referred for secondary evaluation by ophthalmologists. Among the referred, 6,917 (81%) children were examined by ophthalmologists. A total of 2,587 children received spectacles from the project and 462 children were referred to the base hospital for further evaluation. Among those referred, 158 students turned up at the base hospital and received treatment.

Vision for All

Supported by Topcon and Mehra EyeTech, the project aims to provide comprehensive eye care services to eliminate needless blindness in Theni district. As part of this, Aravind-Theni organised a mega glaucoma screening and awareness camp on March 12, 2017 in the hospital premises. A total of 323 patients (New 147, Review 176) turned up and 14 new glaucoma patients were identified. Further diagnostic and investigation procedures like HFA, OCT and CCT were provided free of cost to these newly identified glaucoma patients. The team also did the pupillometer study for which 70 patients were recruited.

Screening for DR commenced in Primary Health Centres on April 11, 2016. So far, 33 screening camps were conducted. A total of 2,477 diabetes patients

were screened, among which 276 were newly identified cases of DR. Four patients underwent Laser treatment. Patients with mild and moderate DR have been asked to come for regular follow-up.

SIB SCOPE Project

LAICO received a grant from Standard Chartered Global Business Services Private Limited (Formerly known as Scope International Private Limited) to implement the following projects under IAPB - *Seeing is Believing (SIB) Projects*. An MoU was signed between LAICO and IAPB on December 1, 2016. The project activities began in March 1, 2017 and the primary focus will be on the areas of:

- Enhancing the quality of outreach with better equipment and deploying electronic medical record to ensure continuity of care (Aravind-Pondicherry)
- Providing affordable treatment for low socioeconomic category patients with painful corneal ulcer, Aravind-Madurai
- Developing an enhanced corneal preservative medium (Aravind-Madurai and Aurolab)
- On-site diagnosis and management of ROP in newborn babies (Aravind-Tirunelveli)
- Equipment support for better diagnosis of corneal ulcers for timely and appropriate surgical intervention (Aravind-Madurai)

QEDJT - PHFI supported Diabetic Retinopathy

Supported by Queen Elizabeth Diamond Jubilee Trust (QEDJT), London through Public Health Foundation of India (PHFI), the main objective of the project is to



QEDJT - PHFI Project: Signing of MoU by Dr. R. Ramakrishnan, Aravind-Tirunelveli; Dr. GVS. Murthy, PHFI and Dr. V. Revathi, Project Director, Tamil Nadu Blindness Control Society

develop a district level model for building capacity at the government health system for effective management (primary to tertiary) of DR. As part of this, training for Non Communicable Disease (NCD) staff and Paramedical Ophthalmic Assistants (PMOAs) from Community Healthcare Centres (CHCs) and Primary Health Centres (PHCs) was arranged from October 4-8, 2016 at Aravind-Tirunelveli.

The first DR Screening was held on December 15, 2016 at Thisayanvilai PHC. Trained NCD staff screened the known diabetes patients for DR using non-mydratric fundus camera in their respective PHC/CHCs. A total of 1,843 patients underwent DR screening of the 4,050 registered diabetes patients from project centres, and 167 DR cases were identified. Of these, 46 patients visited the base hospital for further investigations and treatment. The team also performed 11 lasers and three injection procedures. Short-term training in Lasers

was provided for two ophthalmologists, one each from Tirunelveli Medical College Hospital and Government Hospital, Sankarankoil.

USAID Project to Build Sustainable Capacity and Public Health Measures to Effectively Address the Problem of Visual Impairment and Blindness among Children <6 years in the Service Areas of Aravind-Pondicherry

The project covered mainly three districts - Pondicherry, Cuddalore and Villupuram. With the help of a portable vision screener (Plusoptix), vision technicians screen children starting age at six months for refractive error, anisocoria and strabismus. Through 177 camps, a total of 102,402 children from 372 pre-schools and 299 Integrated Child Development Services (ICDS) centres were screened. Of these, 79,712 children were found to be normal. The remaining 22,690 children were referred to the base hospital for detailed evaluation by the Paediatric Ophthalmology team. Out of these, 3,781 children visited the base hospital for further evaluation and 1,874 children were examined at the 9 referral camps. A total of 1,701 referred children received eye glasses as corrective measure. 48 children (62 eyes) underwent surgeries for eye conditions such as cataract, squint, ptosis, retinal detachment and others. As a part of the project, awareness programmes on paediatric eye diseases were conducted for 1,731 Pre-school teachers, Anganwadi workers and 171 clinicians.

ROPE-SOS

Retinopathy of Premature Eradication-Save Our Sight ROPE-SOS was initiated in August 2015 at Aravind-Coimbatore to provide ROP screening services to rural

USAID Low Vision Project : Screening camp for the visually challenged by Aravind-Coimbatore



areas via telemedicine. The project covers 26 private hospitals and 13 Government hospitals.

In the past year, 4,897 babies were screened (including Retcam and IO) and 1,001 babies were diagnosed to have some form of ROP, of which 87 babies (162 Eyes) were treated for blinding ROP. Avastin injection was given to 33 babies (66 eyes), Lucentis to two babies (four eyes) and Laser was done to 52 babies (92 eyes). Vitrectomy was done to one baby (Two eyes) who had already received laser treatment.

Haemorrhages were found in 142 babies, cataract in six babies of which five underwent surgery and one baby is being followed up. Apart from these, stye was found in one baby and corneal opacity in another.

Continuing Medical Education programmes for NICU nurses, ophthalmologists, paediatricians and neonatologists were conducted in six districts hospitals and created awareness to 426 participants. Attractive posters with information about ROP in Tamil, English and Malayalam languages were prepared and displayed in the premises of various NICUs. Patient information brochures in all these languages were distributed to the parents of babies in the NICUs.

USAID ROP Project

The project started in December 2014 at Aravind-Madurai came to an end in December 2016. The main objective was to develop a comprehensive ROP model that can be replicated in other setups and also to increase early detection of the disease through awareness creation among the various stakeholders. During April 2016 - March 2017, a total of 1,238 new babies were screened at Aravind and various NICUs. A total of 64 eyes have received intravitreal injections and another 34 eyes received laser treatment. 52 children were referred to Vision Rehabilitation Services.

Low Vision Screening, Treatment and Service Provision Project for Children in Coimbatore

The project started in December 2014 at Aravind-Coimbatore came to an end in March 2017. Funded by USAID, the project aimed to establish a rehabilitation centre for children with low vision which will also provide early intervention and appropriate referral to support services.

Totally 455,941 children were screened through this project. Of these, 910 were identified to have low vision and 530 received rehabilitation services funded by USAID. Additionally 26 children were operated for cataract, nine for squint and 417 received

glasses for refractive errors. Through this project, a separate comprehensive rehabilitation service was also developed.

Health Systems Research

The past year was full of vibrant activities and events at Aravind as far as the Health Services Research (HSR) initiatives are concerned. Anchored by members of the LAICO faculty team and the hospital managers, around 20 HSR studies were designed and are being executed. One significant achievement was the acceptance of 16 abstracts for oral free paper or scientific poster presentations at the 10th General Assembly of the International Agency for Prevention of Blindness (IAPB) held in October, 2016 in Durban, South Africa. All those study results are being written up as manuscripts to be published in peer-reviewed journals. A summarised version of all the presentations was shared internally through the weekly grand rounds. Staff members also made scientific presentations in the Vision2020: The Right to Sight-India's 12th Annual National Conference held in Pune, June 2016. In the past year, 45 articles were presented and discussed in the LAICO journal club. In order to further the research capacity building at Aravind, the research division is planning to start an intensive course to orient interested staff on research methodology and to provide continuing support to successfully carry out research studies leading to publications.

Other Events

National Eye Health Summit 2016

Washington DC, US July 12-21, 2016
Mr. R.D. Thulasiraj delivered a talk at the US National Eye Health summit 2016, organised by Prevent Blindness at Washington DC. The meeting focused on eye health for the US and he shared the Indian experience in significantly increasing the cataract surgical volume in the country as well as the challenges that still remain.

Residential Training Programme

Guntur, August 22-24, 2016
Ms. K.M. Sashipriya, Senior Faculty, LAICO participated in the three day residential training programme titled *Health Care in India - Strategic Perspectives* sponsored by the Department of Personnel and Training, Government of India at Bapatla, Guntur District, Andhra Pradesh.



Mr. R.D. Thulasiraj at the National Eye Health Summit, Washington DC

COESCA Congress

Arusha, Tanzania, August 25-26, 2016

Ms. K.M. Sashipriya shared Aravind's experiences related to Hilton Cataract Initiative at the 4th Scientific Congress of the College of Ophthalmology of Eastern, Central and Southern Africa (COESCA). She was at Moshi, Tanzania to meet with the KCCO team to discuss and learn from KCCO's experience working with eye hospitals in Africa.

Training Programme for Vision Centres

Bapatla, November 2, 2016

Ms. Dhivya Ramasamy, Senior Faculty, LAICO participated in the residential training programme for vision centres organised by Andhra Pradesh HR Development Institute at Bapatla. She was the resource person for the session on *Patient centered care and vision centres for universal coverage*.

Ms. Chitra Prasad at the meeting on Cost Management in NGO Hospitals, Chitrakoot



Ms. K.M. Sashipriya at the COESA Congress, Arusha, Tanzania

Cost Management in NGO Eye Hospitals

Chitrakoot, December 17, 2016

Mr. R. Meenakshi Sundaram, Senior Manager, Community Outreach and Ms. Chitra Prasad, Volunteer, Finance and Operations, AECS facilitated sessions on *Principles of cost management, reducing HR costs and costing of outreach patients* at the meeting organised by Vision 2020: The Right to Sight-India in collaboration with Sadguru Netra Chikitsalaya, Chitrakoot.

Annual Conference of Alliance for Continuing Education in the Health Professions

San Francisco, USA, January 26-29, 2017

Ms. Dhivya Ramasamy participated in the conference along with senior Seva Foundation volunteer, Ms. Kathryn Hecht. Following the conference, she had an exposure visit to various organisations in California such as Hesperian Health Guides, Kaiser Permanente, Teach Aids, San Mateo Clinic, Institute for Health and Healing and UCSF.

Ms. Dhivya Ramasamy at Hesperian Health Guides, Berkeley



RESEARCH

Aravind Medical Research Foundation is the umbrella organisation that encompasses research on various fronts - Basic, Clinical, Health Systems and Clinical Trials. Through a multidisciplinary approach, the research programmes at AMRF continue to target various eye diseases from different perspectives.

Among the new programmes initiated in the last year, the one on Paediatric Genetics received considerable support from government funding agency. Some of the collaborative projects are moving forward rapidly and the institute hopes to see some translational research output in the near future.

“Modern technology combined with spiritual consciousness is the need of the day... We want people who have a capacity for all technical skills but we also want people to grow in spiritual consciousness, so that they can act from that consciousness and also handle an electron microscope both. That would be a wonderful thing, because then you would know and see things from a different perspective”.
- Dr. G. Venkataswamy



Proteomics

The research focus at the department is to understand the mechanisms underlying ocular diseases and to translate this knowledge to the clinic for an improved management of the diseases. This is achieved through a comprehensive proteomics approach and complemented by other 'omics' approaches, wherever possible. With state-of-the-art proteomics facility, the department has successfully profiled the proteome of various eye fluids/tissues, which forms the basis of all studies on eye and its diseases. These studies are supported by grants from the Government of India as well as from private organisations such as Mindtree and Cognizant Foundation. Collaborations with international institutes such as the Institut Pasteur, France and University of Liverpool, UK have also been established. In the research on fungal keratitis, the tear proteomics approach allowed the understanding of events that causes corneal tissue damage during fungal infection. This study has emphasised that the treatment of fungal keratitis should focus not only on clearing the infecting fungus, but should also take into account the damage caused by the host. As an extension of this study, a model was built to predict the clinical outcome in *A. flavus* keratitis patients based on the level of complement factor H protein in the tear combined with the ulcer depth and duration of symptoms. This will be helpful in identifying the subset of patients whose ulcer has a high probability of worsening despite treatment. This model can be helpful in guiding a corneal surgeon to make a decision on advising the patient for an early surgical intervention. In addition to the studies on the host factors, a comprehensive analysis is being carried out to understand the differences between the fungal strains isolated from different patients. This study

Research students at work in the Proteomics lab



would throw light on the differences in the virulence of these strains and its implication in the differential response of the patients to antifungal treatment. Yet another important area of research in this department is Diabetic Retinopathy (DR). Proteome wide changes in the serum and circulating serum microparticles have been examined for the identification of potential candidate biomarkers to identify diabetic individuals who are at high risk of developing retinopathy. Promising results have been obtained for one of the serum proteins, C3, the protein with a central role in complement-mediated inflammation. Upon further validation, the level of the processed form of C3 (C3dg) might be useful in identifying the individuals in the pre-diabetic state as well as those diabetics who are likely to progress to DR. Over the past year, through an Indo-UK collaborative project involving AMRF, Aurolab and the University of Liverpool, a novel chemical cross-linker for the treatment of keratoconus was being explored. This treatment option is currently being evaluated as an alternative to conventional UV-A cross-linking, which involves the removal of epithelium and flashing of UV light for 30 minutes, therefore avoiding the pain associated with the conventional cross-linking treatment of keratoconus and the risk of infection. The novel cross-linker under study has shown promising results such as an increase in the tensile strength of the weak keratoconic corneas without causing significant cytotoxicity to the cell layers of cornea. Efforts are underway to establish collaborative efforts for research on Primary Angle Closure Glaucoma (PACG) and Age-Related Macular Degeneration (ARMD).

Molecular Genetics

The department focuses on understanding the molecular pathogenesis of Primary Open Angle Glaucoma (POAG). The involvement of SIX6 gene and its regulatory elements in Southern Indian POAG cases is being explored. Interestingly, through in-vitro and in-vivo experiments, the identified deletion in the regulatory region of SIX6 in POAG cases completely abrogated the expression in retinal ganglion and amacrine cells where the SIX6 gene is expressed, suggesting that the reduced levels of SIX6 expression might be implicated in POAG pathogenesis. Moreover, the department has performed Next Generation Sequencing (NGS) in two large families with positive family history of POAG to identify the



Team involved in the molecular genetic studies of ocular diseases

candidate gene responsible for Glaucoma. In addition, a significant association with one of the SNPs of Matrix metalloproteinase 9 (MMP9) gene rs17576 was observed in Southern Indian PACG patients. MMP9 plays a role in extracellular matrix (ECM) remodelling process which is an important determinant for the shorter axial length in PACG patients. The department is also focusing on identification of putative genetic markers for diagnosis of inherited eye diseases and genetic counselling. Further, it is keen to identify the spectrum of CHST6 mutations in Macular Corneal Dystrophy (MCD). In CHST6 gene, the team has identified six novel mutations and predicted their effect in the pathogenesis of MCD by Insilico methods. Furthermore, the goal is to carry out histopathological analyses of cornea of MCD patients versus controls to understand the pathology of MCD. Molecular genetics team also attempts for unlocking the heritable locks involved in the pathogenesis of PseudoExfoliation Syndrome (PEXS). The department has observed 26 genome-wide significant susceptible variants (P<5E-08) associated with PEXS at the locus 15q24.1 and the near future work will focus on establishing primary culture of lens epithelial cells of PEXS patients and to evaluate any modification with the gene expression.

Genetics of Retinoblastoma

Retinoblastoma is the childhood tumor that affects about 1,500 children every year in India. Most of the patients present at advanced stages where the treatment options are limited and many undergo enucleation. An understanding of the molecular mechanism of Retinoblastoma might benefit the clinicians and patients. In this direction, newer methods were



Analysis of DNA by Agarose Gel Electrophoresis

developed for the molecular diagnosis of the disease by screening the mutations of RB1 gene.

A step-wise method was developed and employed for rapid and effective screening of RB1 gene. The genetic testing is now extended for older patients to know the risk of developing secondary malignancies and also Retinoblastoma in their offspring. This facility is made available for all Retinoblastoma patients not just from Aravind but also from other centres through Cancer Genetic Testing Centre established at Aravind-Madurai.

In addition to genetic testing of RB1 gene, there are additional molecular events involved in the process of tumorigenesis. Using the Illumina-Miseq, a customised gene panel was developed to study the copy number loss or gain of Retinoblastoma associated genes and mutations in the tumor associated genes.

Chemotherapy is the common treatment modality in multiple cancers including Retinoblastoma. However, not all tumors are responding to chemotherapeutic drugs. The expression of the drug transporter pumps was found to be differentially regulated in Retinoblastoma, which does not allow enough drugs to reach the tumor.

Stem Cell Biology

The main focus of research in this department is on understanding the basic biology of limbal epithelial stem cells that maintain the corneal epithelial homeostasis. Earlier on, the department had established a specific method for the identification and quantification of the limbal epithelial stem cells by combining high expression of p63 (or ABCG2) along with high nuclear to cytoplasmic ratio. Since these stem cells constitute only 3-5% of the total limbal



Cycentrifugation of epithelial cells for immunostaining

epithelial cell population and due to the lack of an exclusive marker, elucidating the molecular mechanisms governing the maintenance of stemness remains elusive. A two-step protocol (i) isolation of limbal basal epithelial cells followed by (ii) laser capture microdissection of cells with high nuclear to cytoplasmic ratio was established in the department to enrich the limbal epithelial stem cells to 77%. Transcriptome analysis of such enriched stem cells in comparison to the differentiated corneal epithelial cells identified genes like RPS26, BOLA2B, HIGD2A, IFITM1 and TIMP1 to be unique to stem cells. Higher expression of several stem cell specific genes (MALAT1, S100A6, KRT14, ALDH1A1, ATF4, KLF5 and ERG1) and genes associated with Wnt signalling, cell cycle check points and EGFR signalling were identified in the enriched stem cell population. Further studies are being carried out to confirm these data and to understand the role of these genes in maintenance of stemness.

In addition, small RNA sequencing of the enriched limbal epithelial stem cells was carried out to understand the role of molecular regulators on gene expression. MiRNAs like hsa-miR-21-5p, hsa-miR-3168, hsa-miR-143-3p, hsa-miR-99b-5p, hsa-miR-191-5p, hsa-miR-26a-5p, hsa-miR-10a-5p, hsa-miR-1910-5p were upregulated in stem cells compared to the differentiated corneal epithelial cells. Studies are now being carried out to confirm the sequence data using RT-PCR, Northern blotting and LNA in-situ hybridisation. Understanding the stem cell specific genes, its regulation and role in maintenance of stemness will help in developing better treatment modalities for patients with limbal stem cell deficiency.

Ocular Pharmacology

The research focus of the department is to understand the molecular signalling in human trabecular meshwork especially Rho A/ROCK signalling. In trabecular meshwork (affected tissue in glaucoma), Rho kinase is involved in the synthesis of extracellular matrix components and permeability of Schlemm's canal endothelial cells. Recent evidences suggest that, Rho/Rho associated kinase (ROCK) signalling pathway has been involved in the pathogenesis of Glaucoma and the inhibitors which could target such pathway have a potential role in Glaucoma therapy. Evidences suggest that signals that alter actin cytoskeleton are involved in aqueous outflow regulation. However, the exact mechanism by which the trabecular meshwork tissues sense and respond to different types of mechanical stimuli such as elevated Intraocular Pressure (IOP), circadian rhythm, ocular pulse and shear flow is not well understood. Therefore, the effect of mechanical stress (cyclic IOP) on conventional outflow facility using Human Organ Cultured Anterior Segment (HOCAS) system is being investigated. It is found that cyclic IOP caused a significant increase in IOP (or reduction in percentage change in outflow facility) by 20% in treated eyes as compared to contralateral control eyes. The team is now investigating the mechanism by which IOP is regulated by Rho A/ROCK signalling upon mechanical stress and the effect of rho kinase inhibitors in reducing such resistance in human eyes.

The age-related macular degeneration (AMD) project aims to assess the macular pigment (lutein, zeaxanthin and meso-zeaxanthin) in-vivo in patients with early AMD and to provide a biological indicator for the risk of developing AMD due to the deficiency of macular

Research scholars at HOCAS lab



pigment in Indian population. The findings of this study indicate that early AMD patients showed significantly low Macular Pigment Optical Density (MPOD) as compared to healthy volunteers ($p < 0.0006$). This study adds further evidence that low MPOD is one of the risk factors in AMD pathogenesis and supplementation of dietary carotenoids may be beneficial in delaying the progression of AMD.

Bioinformatics

The bioinformatics department focuses on developing computational methods and bioinformatic analysis of omics data to understand the complexity of biological process and disease mechanism in eye research. It offers a reliable infrastructure and framework comprising Linux and Windows based servers and desktop workstations for bioinformatics services and research support. It provides customised data analysis tailored to the needs of individual research projects across all the research groups. Here, an automated computational pipeline was developed for cancer gene panel that performs a series of steps to identify pathogenic variants for Retinoblastoma (RB). With hard filtering, the pipeline detected several pathogenic variants from in-house MiSeq illumina sequencing data in RB patients that could not have been identified by conventional methods. Recently, fusion of automated pipelines for different variant types has been developed for whole exome data on genetic eye disorders. The pipeline was tested on whole-exome sequencing data sets on normal human and eye diseases. In addition to identifying pathogenic variants, structural bioinformatics approach was used to understand the molecular mechanisms of the diseases and its association with phenotype.

A core computational facility for high-through put omics data analysis



For instance, the analysis of variants in a Cellular RetinALdehyde Binding Protein (CRALBP) showed that the molecular causes of Retinitis Punctata Albescens (RPA) may arise through disruption of 11-cis-retinal interactions, while Retinitis Pigmentosa (RP) is triggered by variants which disrupt interactions with other proteins or disrupting the solvent accessibility. The variants disrupting protein stability may cause Bothnia Dystrophy (BD) and Fundus Albipunctatus (FA).

Comparative genomics approach of ocular isolates from keratitis patients with different clinical outcomes was used to better understand the infection, genome-wide identification of genetic features responsible for multiple virulence and Multidrug-Resistant (MDR) mechanisms. Here, the analysis of five *Pseudomonas aeruginosa* isolates from keratitis patients with different clinical outcomes, wherein the patients were grouped based on corneal healing and who underwent surgery, showed several virulent and MDR mechanisms. Furthermore, *P.aeruginosa* ocular isolates carrying specific features compared to other strains suggest that they may be adapted with specific features to cause eye infections. However, the link between MDR genotypes and clinical outcome or virulence factors is yet to be studied.

Ocular Microbiology

The research approach of microbiology department is focused on elucidating the cellular and molecular events that determine disease progression and treatment outcome in ocular infections. Pathogens exhibit various mechanisms of drug resistance, drug tolerance, virulence and intracellular survival patterns to protect themselves from antibiotics and host innate defenses. Corneal infection with *P.aeruginosa*, a gram negative bacterial pathogen rapidly progresses to severe corneal ulcer where the response to treatment is unpredictable in some cases, irrespective of the antibiotic susceptibility pattern. Persistent survival of the drug sensitive bacterial population may be attributed to impaired host defense mechanisms or increased bacterial tolerance to antimicrobials.

Ocular *P.aeruginosa* isolates exhibit increased tolerance towards aminoglycoside antibiotics and moderate tolerance towards fluoroquinolones, leaving behind a fraction of persisters that remain in a quiescent state by downregulating gene expression. This may lead to incomplete eradication of bacteria from the ocular tissues despite an effective antibiotic treatment.



The Ocular Microbiology team Department

Whole genome sequence analysis of ocular *P.aeruginosa* isolates identified various known and novel mutations in genes encoding drug efflux pumps, β -lactamases, outer membrane porins and other resistance associated proteins. Alterations in the expression of bacterial drug efflux pump and porin genes resulted in differential accumulation and efflux activities in *P.aeruginosa* isolates. Notably, multidrug resistant isolates exhibit several innate and acquired resistance mechanisms like increased efflux activity, production of drug inactivating β -lactamases and mutations in the drug target genes.

Autophagy, a normal cellular catabolic process has been shown to play a major role in the clearance of intracellular bacteria from human corneal epithelial cells. In-vitro studies done with the clinical isolates and chromosomal mutants of *P.aeruginosa* PAOI has demonstrated that the efficiency of autophagy induction depends on the expression of specific bacterial exotoxins. Inefficient clearance due to defective autophagy increases intracellular bacterial load that may lead to persistent corneal infections.

Conferences / Workshops Conducted

Research Advisory Committee (RAC) Meeting

At the 14th RAC meeting of AMRF, faculty members presented their work and received feedback. The poster session held on May 27, 2016 was inaugurated by Dr. D. Karunakaran, Professor and Head, Department of Biotechnology, Indian Institute of Technology (IIT), Chennai in the presence of Dr. K. Sundar, Professor and Head, Department of Biotechnology, Kalasalingam University, Virudhunagar and Dr. S. Thiyagarajan, Faculty Scientist, Institute of Bioinformatics and Applied Biotechnology (IBAB), Bengaluru. The best poster was selected for Professor VR. Muthukkaruppan Endowment Award for the year 2016.

Conference on Approaches to understand Modern Biology through Research

October 7, 2016

As part of October Summit 2016, AMRF organised a one day conference to motivate postgraduate students in Life Sciences towards research. A total of 57 participants attended the conference. Faculty from AMRF, Mepco Schlenk Engineering College, Sivakasi; Kalasalingam University, Virudhunagar; The American College, Madurai and Lady Doak College, Madurai shared inputs. Eight models explaining various scientific themes prepared by AMRF research scholars and technicians were well received by the participants.

AMRF - Dartmouth Education and Research Conference

December 2-3, 2016

AMRF conducted the two-day conference which was initiated by the interaction between Dr. N. Venkatesh

Research Advisory Committee meeting





Dartmouth Education and Research Conference, Aravind-Madurai

Prajna, Chief, Cornea and Refractive Surgery Services, Aravind-Madurai and Dr. Michael E. Zegans, Section Chief, Ophthalmology and Professor of Surgery, Dartmouth College and Medical Center, Hanover, USA. The conference was organised by Professor K. Dharmalingam, Director, Research, AMRF and co-ordinated by Dr. D. Bharanidharan, Scientist, Bioinformatics, AMRF and Ms. Dawn E. Carey, Partner Relationship Manager, The Dartmouth Institute for Health Policy and Clinical Practice.

A total of 10 students and a research scholar from Dartmouth presented research proposals on various eye diseases. Research work at AMRF was presented through lectures and posters, and details of the core research facilities were demonstrated to the participants during their visit to the various laboratories.

Workshop on Basics of Tissue Culture

December 26-30, 2016

The five-day workshop, sponsored by the Department of Biotechnology, New Delhi was inaugurated by Dr. P. Namperumalsamy, Chairman Emeritus, AECS. Professor K. Dharmalingam introduced the research activities at AMRF. The workshop manual was released by Er. G. Srinivasan, Director, Finance, AECS and the first copy was received by Professor K. Dharmalingam. A total of 20 participants were selected for the workshop from nearby colleges / universities. The workshop included lectures and laboratory sessions. Certificates for the participants were distributed by Professor VR. Muthukkaruppan, Advisor, Research, AMRF.

Seminar on Clinical Proteomics and Proteomics Day Celebration

March 18, 2017

AMRF hosted this annual event in commemoration of the formation of the Proteomics Society of India. Professor K. Dharmalingam introduced the event to the participants and highlighted the role of the Society in spreading education for research in Proteomics. The invited faculty included Professor Kumaravel Somasundaram, Indian Institute of Science, Bengaluru; Dr. D. Karunakaran, Indian Institute of Technology (IIT), Chennai; Professor Anuranjan Anand, Jawaharlal Nehru Centre for Advanced Scientific Research, Bengaluru; Professor K. Balamurugan, Alagappa University, Karaikudi; and, Dr. C. Subbulakshmi, Pondicherry University. AMRF faculty also shared their inputs. The one-day seminar was supported by Proteomics Society of India.

Participants of the workshop on Basics of Tissue Culture



Ph.D Awarded

Mr. G. Gowthaman, Department of Molecular Genetics defended his Ph.D thesis titled *Investigating the role of Nuclear, Mitochondrial Genome and microRNA in the pathogenesis of Diabetic Retinopathy* on June 1, 2016. He carried out his studies under the guidance of Dr. P. Sundaresan, Senior Scientist, AMRF.

Ms. Saumi Mathews, Department of Stem cell Biology defended her Ph.D thesis titled *Studies on the characterisation of limbal niche - their role in maintenance and ex-vivo expansion of human corneal epithelial stem cells* on October 21, 2016. She carried out her studies under the guidance of Dr. C. Gowri Priya, Scientist, AMRF

Professor VR. Muthukkaruppan Endowment Award 2016

Created by the students and colleagues of Professor VR. Muthukkaruppan, the Endowment Award is given every year to the best researcher at AMRF. The award is given based on the scientific merit of abstracts and poster presentation by the research scholars. The award carries a certificate and cash prize of Rs.25,000/-.

This year, the award was given to Mr. A. Aloysius Abraham, Department of Molecular Genetics for his outstanding research work on *Effective and comprehensive genetic screening for Retinoblastoma patients*.

Ongoing Basic Research Projects

- Centre for Excellence in Human Mycotic Keratitis
- Pathogenic *Aspergillus* interaction with Innate Immune cells
- Predictive biomarkers for Diabetic Retinopathy (DR) among diabetics and stage specific biomarkers for NPDR and PDR
- Functional analysis of circulating microRNAs and their regulatory role in DR.
- Novel chemical cross-linking of the cornea for the treatment of keratoconus
- Biomarker identification for accelerated ageing of eye in Primary Open Angle Glaucoma (POAG) and Age Related Macular Degeneration (ARMD)
- Comparative genomics of *Aspergillus flavus* clinical isolates
- Limbal miRNAs and their potential targets associated with the maintenance of stemness
- Structural and functional integrity of corneal endothelium after storage in Cornisol, an indigenous intermediate stage corneal storage medium



Mr. A. Aloysius Abraham receiving the Prof. VR. Muthukkaruppan Endowment Award from Dr. P. Namperumalsamy

- Analysis of bacterial persistence mechanisms in recalcitrant ocular *Pseudomonas aeruginosa* infections
- Regulatory role of human microRNAs in microbial keratitis
- Studying the role of Rho A-Rock signalling in conventional outflow pathway using Human Organ Culture Anterior Segment (HOCAS)
- Indian Macular Carotenoids Research (INDMACARE) - A feasibility study
- Is Human Amniotic Membrane (HAM) a suitable reservoir system for the release of drugs in ocular use?
- Genetics and transcript analysis of Rb1 gene in south Indian Retinoblastoma patients
- Establishing the genetic testing centre for childhood ocular cancer (Retinoblastoma)
- Genetic screening in a large family with POAG
- Understanding the molecular mechanisms of chemoresistance in retinoblastoma
- Molecular characterisation of tumor progression in Retinoblastoma
- Molecular genetics of Macular Corneal Dystrophy (MCD) in Indian population
- Molecular genetic studies of PACG in southern Indian population
- Genetic and functional approaches to understand the pathogenicity of POAG
- Genetic evaluation of genes involved in homocysteine metabolism and hyperhomocysteinemia with Pseudoexfoliation syndrome in southern Indian population
- Clinical exome analysis pipeline for eye disease next generation sequencing panel
- Structure and sequence based Bioinformatics approach to the analysis of non-synonymous Single

Nucleotide Variants (nsSNVs) and prediction of its association with retinal diseases

Ongoing Clinical Projects

Cataract

- Aravind Pseudoexfoliation study
- A prospective, non-randomised, single arm, open label study to evaluate the efficacy of multifocal intraocular lenses (IOL) in patients having cataract in both eyes
- A prospective, multicentric, randomised, controlled, study on long term outcomes of phacoemulsification with IOL implantation in patients with Pseudoexfoliation Syndrome
- Femtosecond laser assisted cataract surgery in intumescent cataracts
- Effect of pre-operative oral glycerol on intraoperative complications during phacoemulsification for intumescent cataracts
- Prostaglandin level estimation in phacoemulsification and Femtosecond laser assisted cataract surgery with and without NSAID and correlation with postoperative inflammation and cystoid macular edema
- Comparison of Cumulative Dissipated Energy (CDE) and Balanced Salt Solution (BSS) Fluid used with the Centurion® with the 450 Balanced U/S tip versus the Centurion® with Mini Flared Kelman U/S tip versus the Infiniti® with Mini Flared Kelman U/S tip on hard lenses

Cornea

- Microbiological and clinical outcomes of intrastromal Voriconazole in deep Fungal Keratitis - a Randomised control trial (MALIN)
- Comparison of the effect of Femtosecond Arcuate Keratotomies with limbal relaxing incisions in correcting pre-operative corneal Astigmatism in Phacoemulsification Cataract surgery
- Parasitic Ulcer Treatment Trial (PUTT)

Glaucoma

- Shared Medical Appointments Randomised Trial (SMART)
- A prospective, randomised, comparative study of efficacy and safety of sub conjunctival injectable Mitomycin C (MMC) versus MMC Soaked Sponges in Trabeculectomy patients



The collaboration between Aravind Eye Hospitals and Proctor Foundation close to three decades in the area of clinical research and training is a testimonial to the close bonding, understanding between the two organisations. It is also a proof of the aspiration of both the organisations in finding the appropriate treatment for some of the blinding diseases, which are neglected in the developed world. This partnership between the two WHO collaborating centres also show the sharing of progressive values by the organisations and the individuals who work in them.

The association that came out of Dr. Gilbert Smolin's and Dr. John P. Whitcher's visit to Aravind in 1991 has led to this remarkable collaboration that has resulted in over 100 publications in peer reviewed journals.

- Incidence of snuff out (wipe out) phenomenon post trabeculectomy with MMC in cases of advanced Glaucoma
- Clinical outcomes of Pars Plana versus Anterior Chamber placement of Aurolab Aqueous Drainage Implant (AADI)
- To compare effect of verbal and audiovisual instructions on patient performance while performing automated visual field
- A comparison of topical steroids versus ocular non-steroidal anti-inflammatory drugs after YAG PI
- Web based personalised education to improve glaucoma medication adherence
- Knowledge and medication adherence in glaucoma patients in southern India - Hospital based study
- Quantification of Relative Afferent Pupillary Defect (RAPD) by an automated pupillometer and its

- relationship to retinal nerve fiber layer thickness and visual fields in varying severity of Glaucoma
- Anterior segment OCT imaging of conjunctival filtering blebs after MMC augmented trabeculectomy versus ologen augmented trabeculectomy
- Anterior segment OCT imaging of conjunctival filtering blebs after MMC augmented combined surgery: Subtenon injection versus soaked sponges

Uvea

- First-Line Antimetabolites as Steroid-sparing Treatment (FAST) Uveitis Trial
- Diagnostic markers in ocular sarcoidosis in a high TB endemic population - A multicentre Study
- A Phase IIIb, multinational, multicentre, open-label extension study assessing the long-term safety of PRN Intravitreal Injections of DE-109 in subjects with non-infectious uveitis of the posterior segment of the eye of those who have participated in the SAKURA development programme

Retina

- Conventional versus inverted flap technique for large macular holes: A prospective, randomised clinical trial
- Comparative study of visual and functional outcomes in polypoidal choroidal vasculopathy with respect to presence or absence of pachy choroid features
- A study to assess the effectiveness of a Computer Assisted Diagnosis (CAD) programme in identifying the presence of DR and diabetic macular edema (DME) in persons with diabetes.
- A prospective, multi centre observational study on evaluation of DME profile with OCT and its correlation with other variables in DR in tertiary care centres in India
- Demography and role of Anti VEGF in idiopathic Macular Telangiectasia type 2 with neurosensory detachment
- Spectrum of eye disease in Diabetes mellitus (SPEED)
- A comparative study to analyse the outcomes of large macular holes operated with ILMP with inverted flap versus autologous platelet injection versus conventional surgery
- A prospective, non-comparative study on the safety and efficacy of 23 and 25 gauge primary pars plana vitrectomy for the management of primary Rhegmatogenous Retinal Detachment (RRD)

- Quantification of RAPD by automated pupillometer and its relationship with visual acuity and AMD dimension
- RAINBOW study: A randomised, controlled study evaluating the efficacy and safety of Ranibizumab compared with laser therapy for the treatment of infants born prematurely with Retinopathy of Prematurity (ROP)
- RAINBOW extension study to evaluate the long term efficacy and safety of Ranibizumab compared with laser therapy for the treatment of infants born prematurely with ROP

Paediatric Ophthalmology and Adult Strabismus

- Causes of childhood blindness and low vision in a tertiary referral eye centre in southern India
- Efficacy and safety of 0.03% topical Tacrolimus ointment in the treatment of vernal keratoconjunctivitis in the paediatric population in a tertiary eye care centre in southern India

Neuro-ophthalmology

- A pivotal phase II/III, randomised, double-masked, sham-controlled trial of QPI-1007 delivered by multi-dose intravitreal injections to subjects with acute Non-arteritic Anterior Ischemic Optic Neuropathy (NAION)
- Quantification of Relative Afferent Pupillary Defect (RAPD) by an automated pupillometer and its relationship to visual acuity, colour vision, visual fields before and after treatment of patients with optic neuritis and NAION

Health Systems Research

- Comprehensive Eye care Work Assessment (CEWA) study in Theni district of Tamil Nadu
- Corneal Ulcer Prevention (CUP) through health education - A prospective intervention study
- Validation of fundus imaging grading results by an automated detection algorithm with that by a human grader

Aurolab Clinical Trials

- A prospective, non-randomised, single arm, open label study to evaluate the performance of Multifocal Intraocular Lenses (MFIOL) in patients having cataract in both eyes.

MANUFACTURING OPHTHALMIC SUPPLIES

Arising out of Aravind's conviction that quality eye care be provided to the rich and poor alike, Aurolab was founded 25 years ago. Over the years, working towards its mission of making quality ophthalmic products affordable and accessible to the vision impaired worldwide, Aurolab ventured into manufacturing various ophthalmic consumables. Apart from IOLs, Aurolab now manufactures suture needles, pharmaceutical products, surgical blades, equipment and special products in a cost-efficient manner with stringent quality standards.

Today, Aurolab owns 9% of the global market share for IOLs and more than 20 million people around the world see through Aurolab's IOLs. Aurolab products are exported to over 160 countries.

Aurolab is eager to embrace new opportunities and challenges that come its way. Stepping into the unknown confidently and making a successful venture is the guiding principle for the organisation's future growth in diversified segments.





Special guests, Dr. D. Ramamurthy and Mr. Karumuttu T. Kannan releasing Aurolab's Silver Jubilee souvenir

In commemoration of Aurolab completing 25 years of service, several programmes that involved the participation of all staff, ex-employees, dealers, suppliers and also the families of the employees were arranged.

New Products

Aurovue Dfine

Aurolab has launched *Aurovue Dfine*, a hydrophobic, diffractive, multifocal, aspheric, foldable preloaded intraocular lens with the near addition of +3D. This lens has 11 concentric rings in the optic which will help the patient do routine works without spectacles.

The optic of *Aurovue Dfine* multifocal intraocular lens has been uniquely designed to provide maximum energy at near and optimum energy at distance. With this design, the patient can enjoy excellent near vision with uncompromised distance vision.

AuroSlim

The Blades Division has introduced a new brand of disposable ophthalmic surgical blade named *AuroSlim*. This is manufactured with advanced technology to achieve ultra thin profile which ensures precise incision during the cataract surgery.

AuroTrocar

AuroTrocar, the self-sealing ophthalmic trocar is developed to reduce the burden of high costs to both hospitals and patients. The valved device meets the needs of retinal surgeons with available models - 23G and 25G.

Stainless Steel Suture

Aurolab continues to manufacture products to fortify other surgical speciality segments. Recently, stainless steel suture, *Re-Form* was introduced to improve surgical outcome in ear reconstruction surgery (Microtia).

Product portfolio extension

Auroflex Toric

Aurolab commenced manufacturing higher cylinders in *Auroflex Toric* (Hydrophilic Toric IOL) from 3.5 D to 6.0 D in 0.5 D increments. The online calculator to find out the power of the lens was also updated accordingly.

Aurovue EV Preloaded

With the addition of diopters 5.0 to 9.0 D and 25.0 to 35.0 D, *Aurovue EV Preloaded* is now available from 5.0 D to 35.0 D range.





Get-togethers organised to commemorate Aulolab's Silver Jubilee
Aurolab Ex-employees



Aurolab Dealers



Aurolab Employees' families



Aurolab Suppliers





Dr. Asim Sil presenting the memento to Dr. Arup Chakrabarti at the workshop on TORIC IOLs, organised in Kolkata

Marketing Activities

Aurolab organised

- a one-day workshop for ophthalmologists in Kolkata to brief them on the use of Auroflex Toric IOLs on May 28, 2016.
- a training programme on multifocal optics and marketing strategy for multifocal intraocular lenses for the sales team at New Delhi on July 30, 2016 and at Pune on August 2, 2016.
- a phaco training programme for sales and service engineers from December 9-16, 2016 to brief them on the new system and functions.
- domestic dealers meet in January along with the Silver Jubilee celebrations. Products such as *Aurovue Dfine*, Phaco machine and *Esee - Autorefractor* were introduced during the meet which was attended by 32 dealers.

- a workshop titled *Effective Counselling* for patient counsellors of Aravind Eye Hospitals on December 10, 2016 and on February 4, 2017. A total of 75 counsellors across all Aravind Eye Hospitals attended the workshop. The programme focused on enhancing their counselling skills, and also provided them an update on Aurolab products and quality assurance systems.
- e-reporting software for sales team to maximise the performance and understand the customer needs. Aurolab has engaged a brand consultant to build its brand superiority for Aurovue range of products.

Regulatory Activities

The ISO and CE Surveillance audits were carried out successfully and the validity of the certificates have been extended for the next five years. The Kenya GMP certificate audit was successfully completed and Aurolab received validity for the next three years. Premium products such as *Aurovue EV Preloaded* and *Auroseek* successfully got registered in the Republic of Philippines and Sri Lanka. *G-flox*, *Aurocol* and *Aurotim* were registered in Uganda.

Prominent Trade Shows Attended

- Annual Conference of American Society of Cataract and Refractive Surgeons (ASCRS), New Orleans, USA, May 7-9, 2016
- Annual Conference of Asia - Pacific Association of Cataract and Refractive Surgeons, Bali, Indonesia July 27-30, 2016

Pongal celebrations at Aurofarm



- Annual Conference of European Society of Cataract and Refractive Surgeons (ESCRS), Copenhagen, Denmark, September 9-13, 2016
- Annual Conference of American Academy of Ophthalmology (AAO), Chicago, USA, October 15-18, 2016
- General Assembly of International Association of Prevention of Blindness (IAPB), Durban, South Africa, October 28-30, 2016

At the All India Ophthalmological conference held at Jaipur during February 16-19, 2017, Aurolab promoted products such as *Aurovue Dfine*, *Auroslim* and *Esec* (Autorefractor). At the Lunch Symposium sponsored by Aurolab, various ophthalmologists shared their experiences of using Aurolab products.

ICMR Exhibition

Mr. S.Sivanand, Marketing Manager-Domestic and Mr. Manoj Kumar Chauhan, Senior Area Development Manager, New Delhi participated in the one-day exhibition on *Innovations in Medical Science and Biotechnology* organised by Indian Council of medical Research (ICMR) at Rashtrapati Bhavan, New Delhi on March 9, 2017. They displayed Aurolab product, *E-See*, developed in collaboration with PlenOptika, USA which was one of the 45 innovative technologies shortlisted from more than 300 applicants.

Aurolab promoted its non-ophthalmic sutures at the Annual Conference of Tamil Nadu Ophthalmic Association, Pondicherry Association of Plastic Surgeons and at the conference of Indian Society for Reconstructive Microsurgery.

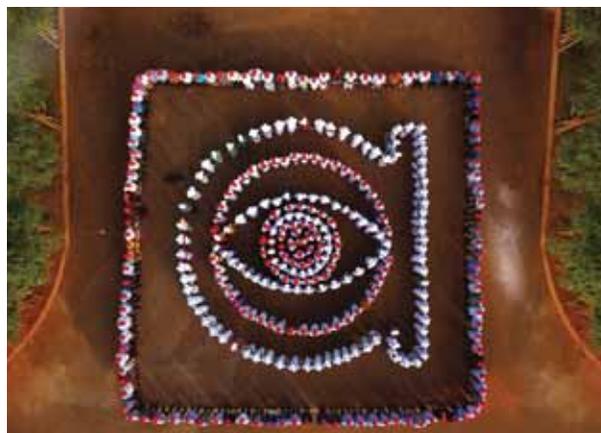
HR Activities

Silver Jubilee Celebrations

Elaborate programmes were organised to commemorate the Silver Jubilee of Aurolab. Celebrations started off with a mega signature board event on November 25, 2016. The signatures/messages of employees are preserved as an everlasting memory that shall illuminate the spirit of the organisation and its people.

As a mark of showing harmony, staff members lined up to form the Aurolab logo. Around 750 employees participated.

A get-together of the families of senior employees was arranged on December 18, 2016. To many in the group, this was their very first visit to the facility, Aurolab and Nithyatha. A photo gallery displaying the various milestones and developments of Aurolab was organised



Staff members lined up to form the Aurolab logo

in Nithyatha. Games were organised to entertain the children. A get-together of the ex-employees was organised on December 24, 2016 to acknowledge the contribution and dedication of the staff members who were with Aurolab.

On January 28, 2017, Aurolab's 25th annual day was celebrated in a grand manner, in the presence of all employees, senior staff of AECS and well wishers. Mr. Karumuttu T. Kannan, Managing Director, Thiagarajar Mills and Dr. D. Ramamuthy, Chairman, The Eye Foundation, Coimbatore were the Special guests.

Employee Welfare Activities

Leadership Training Programme

Aurolab organised a leadership training programme for its newly promoted production staff members from June 13-18, 2016. The training helped the participants understand the basic concepts of leadership and its importance.

Observing Special Days, Festivals and Entertainment Activities

Aurolab observed Child Labour Abolition Day on June 12, 2016 and International Yoga Day on June 21, 2016. Festivals such as Pongal and Navaratri were celebrated with great enthusiasm. Motivational talks on several topics were held for various cadres of staff. Healthcare awareness talks were also arranged regularly. An awareness session on basic fire safety and evacuation procedures was arranged along with a mock drill on June 25, 2016. Gardeners and sanitary staff of Aurolab were taken on a tour to Pondicherry and Cuddalore on September 17, 2016.

CENTRAL FUNCTIONS

Human Resources Development

Towards NABH Accreditation

The entire HR systems and practices were reviewed and streamlined for Aravind-Madurai and the hospital successfully cleared the pre-entry level assessment of NABH certification. Policies related to the employment of Mid-Level Ophthalmic Personnel (MLOP) were revised with necessary modifications.

Performance Appraisal System

Steps were taken to develop an appropriate performance appraisal system for doctors. Ms. Cindy Harrison, Vice-President, Talent Selections, Henry Ford Health Systems handled a session for the heads of various departments on giving constructive feedback, so as to elicit the best from their staff members.

MLOP Training

Efforts were taken to reintroduce competency based training for MLOPs at Aravind Eye Hospitals. The Aurosiksha team worked with the MLOP Training Division, to initiate a skill certification process. The team is now committed to certify the current batch of MLOP trainees (2016-18) of the four clinical streams: Out-patient and In-patient Services, Operating Room Assistance and Refraction. In order to introduce this new training paradigm across all Aravind Eye Hospitals, a Training of Trainers Workshop was conducted bringing together the MLOP training

Participants to the Training of Trainers Workshop



Aravind staff along with Mr. R.V. Duraisamy donating the Angaadi proceeds to Ms. Latha Guru Bharathy, Director, Admin., M.S. Chellamuthu Trust, Madurai

teams from all Aravind centres. A total of 52 staff attended the workshop which was held during August 17-18, 2016. The participants were sensitised to the competency based approach and importance of adult learning principles. A plan was put together to bring in a standardised, effective training programme - by introducing skill certification, using rubrics for assessment, standardised scheduling of training and utilising the online Aurosiksha platform to access standardised training resources. In continuation to this workshop, the first year MLOPs at Aravind Eye Hospitals were evaluated in 22 skills using Aurosiksha rubrics.

Angaadi

Last year too, the great charity fest, Angaadi evoked good response from the staff members at Aravind-Madurai and Aravind-Pondicherry. The proceeds from the sales of goods were donated to needy charitable foundations.

MLOP Alumni Meet

The success of Aravind's unique operational model owes a great deal to the whole-hearted commitment of the MLOP network that is rightly referred to as the backbone of the system. Right from the early days of the hospital, it was the MLOPs who played a prominent role in the care giving process. As Aravind celebrated its fortieth year of service, it was truly appropriate to bring all these MLOPs who had been with the organisation

Moments of Relaxation



Hospital Day Celebrations, Aravind-Madurai



Paediatric Ophthalmology Clinic at Aravind-Pondicherry celebrating Children's Day



Celebrating Christmas, Aravind-Tirunelveli



Motivational lecture for nurses, Aravind-Madurai



Pongal celebrations at Aravind-Coimbatore

Sports Day, Aravind-Salem



Part of the LAICO team during the excursion





Participants to the Inspired Leadership Programme

for a minimum of 10 years on a common platform. The Alumni meet was held on October 1-2, 2016 which gave an opportunity for the makers of the organisation to come together, relive old memories and spend time with their peers and the founding members.

Employee Engagement Programme

Employee engagement initiatives focused on *Communication* and *Growth* at different levels. *The Aravind Way* project played a key role in helping demystify Aravind's value system. The seven values / pillars identified would act as guiding principles and empower people in decision making at all levels.

During the year, there was an attempt made to address growth of an employee at different levels. Professor DVR. Seshadri, Faculty, Indian School of Business, Hyderabad and Dr. Thimappa Hegde, Director and Senior consultant Neurosurgeon, Narayana Hrudayalaya Institute of Neurosciences,

Bengaluru facilitated Inspired Leadership Programme which spanned over 6 months. Everyone goes through periods of uncertainty at different points of life and there should be someone to help them think through. As a step towards addressing this, Mr. Larry Hulbert, Coach and Organization Development Consultant, Seattle, USA, through a workshop sowed the idea of establishing mentor-mentee relationships. The initiative *Dialogue for Development* is designed to establish dialogue around growth between employees and their respective reporting authorities. This is very crucial to employee engagement and will act as a fountainhead for more relevant and desirable initiative in the future.

Last year too, Aravind found place in the travel itinerary of Jagriti Yatris. The team consisting of close to 500 yatris visited the organisation on December 26, 2016 and had an opportunity to interact with the senior management team of Aravind. The documentary, *Healing*

Participants to the Alumni Meet sharing a light moment with Dr. G. Natchiar





Dr. S. Aravind and Mr. R.D. Thulasiraj with the Jagriti Yatris

the eyes of the world capturing the unique Aravind model of compassion at work, was released on the occasion.

Employee Development Activities

Continuing Professional Education (CPE)

CPE programmes were held for different cadres of staff on various occasions. These turned out to be platforms where the staff could learn best practices from each other, and share knowledge so as to bring out the best in them. The paramedic staff were regularly updated on the various developments in the clinical field.

Welfare Activities

To promote the holistic welfare of the staff and employees, motivational lectures, yoga sessions, healthcare awareness programmes, meditations and bhajans were held in the various Aravind facilities.

As part of the Aurowel health check-up programme,



Aravind team with the Corporate Cricket League Trophy

all the staff members were examined for basic health problems. Those found to have serious issues were referred to general physicians. A total of 236 senior staff and managers availed the medical insurance benefits.

On the recreation front, different centres hosted sports day, magic show, Melody Friday, excursions and other entertainment programmes. At the third season of Corporate Cricket League, organised by Madurai Round Table on March 11, 2017, Aravind team shared the Winners' Trophy.

Under the Programme for Aravind Staff Support, funds to support education of staff children were disbursed. A total of 244 employees and 336 children benefited under this scheme.

Family get-togethers were organised for the staff of vision centres in Aravind-Tirunelveli and Aravind-Pondicherry, to orient their family members to understand the importance of their job and render their fullest support.

Participants to the Accounts CPE, Aravind-Madurai



Information Technology and Systems

Electronic Medical Record (EMR) has been successfully implemented in all Aravind community centres, at Aravind-Udumalpet and Aravind-Coimbatore City Centre. It was launched in a phased manner in Aravind-Madurai and is currently being used for all new patients across different specialities. With user feedback, the system is constantly being improved.

In order to ensure integrity of data, the master databases are now managed centrally. This ensures better continuity of care as patients' medical records can now be instantly accessed from any of the Aravind centres.

A Collaboration to Share and Learn

To ensure best practices in EMR implementation, Aravind, L.V. Prasad Eye Institute and Sankara Nethralaya came together and formed an Information Technology (IT) consortium to share and learn from each other's experience. While the initial objective of this collaboration was to enhance the EMR platform, discussing security and many other aspects of IT are being discussed currently.

New Developments and Enhancements

Data Management System was developed and implemented for the Comprehensive Eye Care Work Assessment research study in Theni district. A web based data-entry application was developed for the Indian Macular Carotenoids Research (INDMACARE) study.

A web-based application was developed to capture and display images related to diseases of the cornea for learning purpose. Another web-based application, Geoyedata was developed which enables to upload census data in excel format. The files are organised state-wise which makes it easy for the user to search / view and also to download.

Listed below are the existing software that underwent enhancements to improve their usability:

Integrated Hospital Management System (IHMS) was upgraded with the following features:

- Provision to capture denomination details of cash collected
- Consolidated cash collection report covering both out-patient and in-patient services for accounting purpose
- Central master for procedures was implemented to ensure that consistency in charging is followed across the system



Aravind's EMR team in discussion with their counterparts at L.V. Prasad Eye Institute and Sankara Nethralaya

- Self-registration kiosk was introduced for patients thus eliminating the need for waiting in the queue
- Provision to capture photo of select group of patients which is important to be included in the medical report.

Materials Management System was upgraded so as to enable automation of purchase details. Purchase and sales transaction details in pharmacy were integrated with Tally, an accounting software.

Modifications were made in the Vision Centre Management System so that fundus images taken at these centres could be accessed at the base hospital for further consultation.

Integrated Human Resource Information System underwent tremendous modifications making it comprehensive with report generation capability.

Training Management Information system was further developed to capture details of all Aravind trainees.

Provision for online application for long-term fellowship programmes was added. A portal was developed to conduct online exam for fellows in Glaucoma.

New module with provisions to upload necessary images were introduced in the Visitors Portal so as to capture the complete details of all who visit Aravind. A web-based application was developed to store, manage and export the details of INDMACARE study including patient records and fundus images.

IT Infrastructure

On the networking front, technology was updated across all Aravind satellite centres, so as to ensure system security and optimum utilisation of the servers.

To ensure security and save costs, a number of systems have now moved from Windows to Linux. Storage capacity of the servers was increased tremendously to accommodate ever growing outputs from investigation devices like OCT, FFA, and electronic medical records. Public announcement system was implemented in the hospital to use during emergencies.

IT Services to Other Eye Hospitals

The department provides IT solutions for eye hospitals either as part of capacity building project or upon direct requests. The team visits these hospitals for a period of three to four weeks to implement the system, provide training to users, and also to ensure optimum utilisation of the software. In the last year, IHMS software was implemented in 8 hospitals in India and one each in Nepal and Bangladesh. Upon request, training was provided to the respective hospital staff on the use of the software. The IT team also visited various user hospitals to assess the current utilisation, demonstrate new features, and implement the upgraded version. During the last year, such visits were made to four hospitals in Bangladesh, two in Nepal, Kenya and one each in Zambia and India.

Medical Shop Management System was installed in GM Eye Hospital, Mettupalayam and Sankara Eye Hospital, Pammal. Optical shop Management System and Materials Management System were set up in Sankara Eye Hospital, Pammal.

Vision Centre Management system was installed in BRAC centres in Bangladesh and M.N Eye Hospital, Chennai.

Aravind Tele-Ophthalmology Network

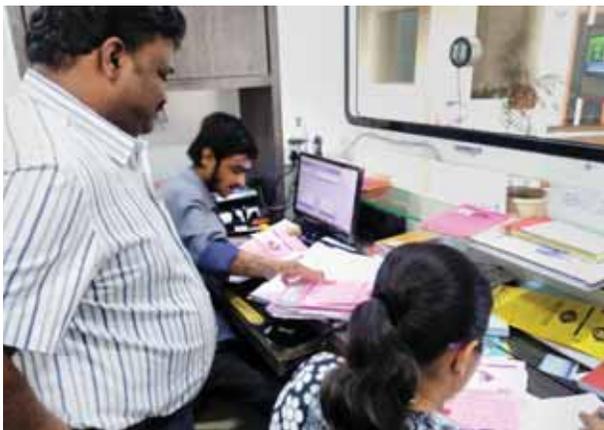
At Aravind, tele-ophthalmology network plays a great role in taking eye care to the rural masses, mainly by facilitating the tele-consultation process in vision centres. Around 1,600 tele-consultations are being handled each day at Aravind across the various vision centres. During April 2016 - March 2017, nearly 244,160 cases were handled through tele-consultation across the 61 vision Centres. Aravind works with various diabetes centres in the screening of diabetics through tele-consultation with the help of Aravind Diabetic Retinopathy Evaluation Software (ADRES). In the year -ending March 2017, a total of 2,011 cases were evaluated using ADRES.

The network also plays a major role in various educational interactions that include grand rounds, journal clubs, clinical meetings, postgraduate classes and classes for MLOPs. More than 400 video conferencing sessions including a few for international conferences were conducted during the last year.

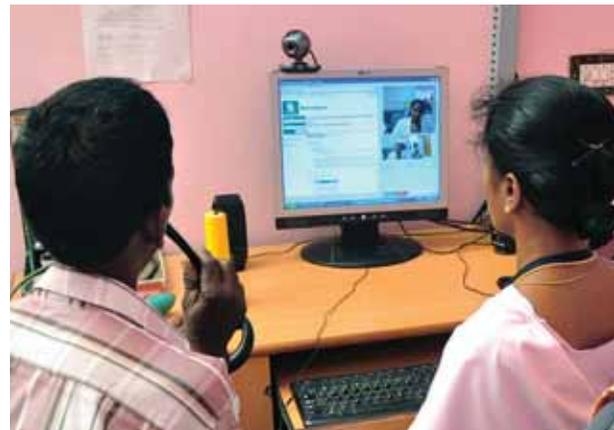
Biostatistics

The department supports data entry, management and statistical analysis for the various clinical and non-clinical research studies at Aravind. It also extends support to Aravind staff in pro-forma development, sample size calculation, data management, data analysis and reporting results for the various research projects. The team analysed and generated reports of mass cleaning initiative held simultaneously across the Aravind centres, which were very useful and appreciated by everyone.

Mr. M. Karthikeyan trains the staff at Rotary Eye Hospital, Navsari on the use of IHMS software



Tele-consultation in progress at Alanganallur Vision centre



Library and Information Centre

Aravind Library and Information Centre continues to implement new technology to improve its resources and share information in the most productive way. Geo Eye Database was created which provides data on population and demographics as well as Cataract Surgical Rate for countries all over the world.

Supported by Seva Foundation, a two-day Continuing Education Programme for Medical Librarians was organised at Aravind-Pondicherry from November 19-20, 2016. The purpose was to provide the participants an understanding of medical database and principles of effective online searching. A total of 15 librarians from hospitals such as Sadguru Netra Chikitsalaya, Chitrakoot; Vivekananda Mission Ashram Netra Nirmay Niketan, West Bengal; H V Desai Eye Hospital, Pune; Sankara Nethralaya, Chennai and Gandhigram Institute of Rural Health, Dindigul participated. In addition, librarians from Aravind Eye Hospitals also participated. The entire programme was led by Ms. Vasumathi Sriganesh, Director - QMed Foundation, Mumbai.

A bibliometric analysis of Aravind publications, from 1978 till date was carried out and the result was published as a poster and book. With a view to promote reading habits among the MLOPs, libraries were opened in different Aravind centres.

Aravind Communications

One of the main achievements of the department during the last year was the standardisation of all stationaries - clinical forms, signage, patient information/education materials etc. across the system. Most of the stationaries used in the clinics were revamped in compliance to the NABH standards. Visits were made to satellite hospitals to ensure this and also to develop a good rapport with the teams there. The department also helped bring out the manual on outreach eye care for developing nations by laying out the design and assisting in editorial works. Video developed by the Audiovisual Department won first prize at the Phaco Excel CME held in Pondicherry.

Aravind Communications team during its visit to Aravind-Salem



Participants to the Continuing Education Programme for Medical Librarians at Aravind-Pondicherry



RECOGNITIONS AND ACHIEVEMENTS

Aravind Eye Care System (AECS) and several of the senior leaders of the organisation were felicitated recognising the unique service rendered by them to the field of ophthalmology and eye care. Several of the faculty were invited to deliver titled orations in different fora. Last year too, Aravind was fortunate to win laurels in various prestigious meets, thanks to the whole-hearted dedication and commitment of the staff members.

RECOGNITIONS

BOS Gold Medal Oration

Mr. R.D. Thulasiraj, Executive Director, LAICO delivered the Oration titled *Holy Grail of Universal Eye Health - A Possibility* at the Annual Conference of the Bangalore Ophthalmic Society (BOS) held in Bengaluru from June 18 to 19, 2016.

Telemedicine Society of India Scroll of Honour

Dr. P. Namperumalsamy, Chairman Emeritus, AECS was presented with the Scroll of Honour towards his outstanding services in delivering eye care to the rural poor through telemedicine at the Tele-e-Health conference held in Madurai on June 19, 2016.

Vocational Excellence Award

Ms. S. Avudaiammal, Superintendent, Medical Records Department, Aravind-Tirunelveli received Vocational Excellence Award from Rotary Club of Tirunelveli on July 10, 2016.

Bireswar Chakrabarti Oration Award 2016

Professor K. Dharmalingam, Director, Research, AMRF received Bireswar Chakrabarti Oration Award 2016 at the 23rd Annual Meeting of Indian Eye Research Group (IERG) held at L.V. Prasad Eye Institute, Hyderabad from July 30 to 31, 2016.

OPPI Healthcare Access Award 2016

Aravind Eye Care System was presented with the prestigious Healthcare Access Award 2016 by the Organisation of Pharmaceutical Producers of India (OPPI) at New Delhi on August 19, 2016. The award recognises Aravind's contributions in the field of access to healthcare achieved through innovative ideas.

Kundrakudi Thiruvannamalai Mutt Award

At the auspicious celebration of Maha Guru Puja conducted by Kundrakudi Thiruvannamalai Mutt, an age-old monastery of southern India on August 21, 2016, Guruji Ponnambalam Adigal awarded the titles 'Manithaneyya Maruthuva Maamani' to Dr. P. Namperumalsamy, and 'Manithaneyya Maruthuva Thilagam' to Dr. G. Natchiar, Director Emeritus, AECS appreciating their selfless and enormous medical service.

Dr. C.S. Grover Oration

Dr. HariPriya Aravind, Chief, Intraocular Lens and Cataract Services, Aravind-Madurai, delivered the Dr C.S. Grover Oration on *Preventing Post-operative Endophthalmitis - The Aravind Perspective* at the North Zone Ophthalmic Society and Uttarakhand State Ophthalmic Society Meeting held at Dehradun from October 17 to 19, 2016.

Mehra ACOIN AWARD - 2016

Dr. R. Ramakrishnan, Chief, Glaucoma Services, Aravind-Tirunelveli was presented with the award by the Association of Community Ophthalmologists of India (ACOIN) at the annual conference held at Trichy from October 21 to 23, 2016.

Dr. Ishwarchandra Oration

Dr. HariPriya Aravind delivered the Dr. Ishwarchandra Oration on *Measuring outcomes following cataract surgery* at the Annual Conference of Vidarbha Ophthalmic Society held at Nagpur from October 21 to 23, 2016.

Lifetime Achievement Award

Aravind Eye Care System was honoured with Lifetime Achievement Award at TiECON 2016, flagship entrepreneurship conference held at Chennai on November 4, 2016. Dr. P. Namperumalsamy received the award.

Prestigious Positions at GSI for Aravind Glaucoma Team

Three of Aravind's senior glaucoma consultants were elected unanimously for prestigious positions in the Glaucoma Society of India (GSI).



Dr. R.D. Ravindran, Chairman receives the OPPI Healthcare Access Award 2016



Scroll of Honour to Dr. P. Namperumalsamy at the Tele-e-Health Conference

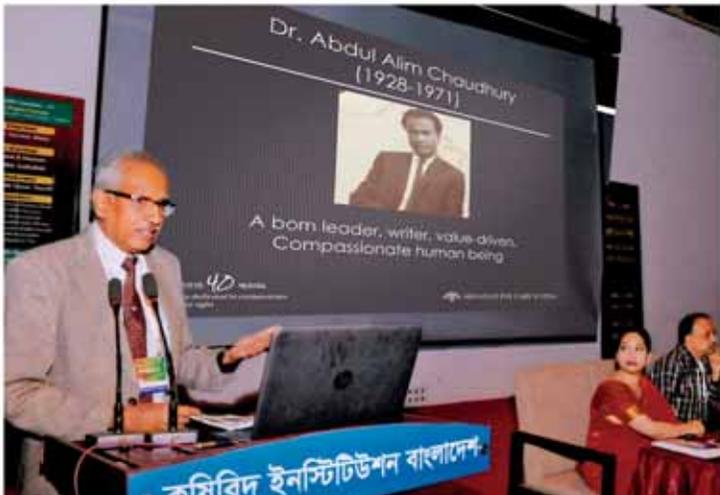


Dr. P. Sundaresan receives the Hari Om Ashram Alembic Research Award from Shri. Pranab Mukherjee, the Honorable President of India



Professor K. Dharmalingam receives the Bireswar Chakrabarti Oration Award from Dr. G.N. Rao

Alim Memorial Oration by Mr. R.D. Thulasiraj



Dr. Marie Fredrick receives the BMJ Award

Dr. R. Ramakrishnan at the Dr. Noel Moniz Memorial Award ceremony





Dr. Haripriya Aravind receives the Dr. C.S. Grover Oration Award from Dr. K.K. Paul, Governor of Uttarakhand



Dr. P. Vijayalakshmi receives the Lifetime Achievement Award at Sadguru Conclave



Professor VR. Muthukkaruppan being honoured by the Indian Immunology Society



Mr. R.D. Thulasiraj being honoured by the Bangalore Ophthalmic Society



Dr. S. Aravind receives the Madurai Management Association Award

Dr. Haripriya Aravind receives the Dr. Ishwarchandra Oration Award



Dr. P. Namperumalsamy at the FILA ceremony



Dr. S.R. Krishnadas, Aravind-Madurai was elected the President, Dr. R. Venkatesh, Aravind-Pondicherry, the Treasurer and Dr. Ganesh V Raman, Aravind-Coimbatore, the Convenor for the Southern Zone Glaucoma Education at the Annual Conference of the GSI held at Palampur, Himachal Pradesh from November 4 to 6, 2016.

Forbes India Leadership Award (FILA)

Dr. P. Namperumalsamy was honoured with FILA 2016, in the category of *Entrepreneur with Social Impact* at Mumbai on November 8, 2016. The award celebrates transformational leadership and corporate excellence.

BMJ Award

A ECS was awarded the South Asia BMJ Award in the category, *Excellence in Medical Education*. Dr. Marie Fredrick, Medical Consultant, Aravind-Pondicherry received the award on behalf of the organisation at New Delhi on November 19, 2016.

Best Social Service Award

Ms. M.N. Chidambaram, Nursing Superintendent, Aravind-Tirunelveli received the Best Social Service award for her selfless work and service by Annai Theresa Social Service Organisation at Tirunelveli on December 11, 2016.

Lifetime Achievement Award at Sadguru Conclave

Dr. P. Vijayalakshmi, Professor, Paediatric Ophthalmology and Adult Strabismus Services, Aravind-Madurai was presented with the Lifetime Achievement Award at Sadguru Conclave held in collaboration with the American Association for Paediatric Ophthalmology and Strabismus at Sadguru Netra Chikitsalaya, Chitrakoot, Madhya Pradesh from December 7 to 8, 2016.

Lifetime Achievement Award by Centre for Sight

Dr. P. Namperumalsamy was presented with the award for his contribution towards teaching generations of residents and fellows in ophthalmology by Centre for Sight at Hyderabad on January 13, 2017.

Dr. Noel Moniz Memorial Award

Dr. R. Ramakrishnan was bestowed with the 8th Dr. Noel Moniz Memorial Award in recognition of his outstanding contributions in the field of Glaucoma by Cochin Ophthalmic Club on January 22, 2017.

Alim Memorial Oration

Mr. R.D. Thulasiraj delivered the prestigious Alim Memorial Oration on *Eye Care for Everyone: Universal Eye Care, Now a Possibility* at the Annual Conference of Ophthalmological Society of Bangladesh held at Dhaka from February 5 to 8, 2017.

Special Honour by Indian Immunology Society

Indian Immunology Society honoured Professor VR. Muthukkaruppan, Advisor-Research, AMRF at its 43rd Annual Meeting held at GITAM University, Visakhapatnam on February 16, 2017. He was recognised for his contributions as the founding member, past president and architect of the Society.

Madurai Management Association Award

The Association presented Public Service Excellence Award to Aravind Eye Hospital, Madurai on the occasion of National Management Day Celebration held at Madurai on February 21, 2017.

Hari Om Ashram Alembic Research Award

Dr. P. Sundaresan, Senior Scientist, Molecular Genetics, AMRF received the Medical Council of India-Hari Om Ashram Alembic Research Award for 2010 from the Honorable President of India at Rashtrapati Bhawan, New Delhi on March 28, 2017.

Honour for Aravind Eye Hospital, Salem

Aravind-Salem was honoured by the NGO, *People Development Initiatives* for serving the poor through outreach. Ms. K.B. Sasikala, Out-patient Department received the award on behalf of the hospital on March 31, 2017.

ACHIEVEMENTS

Best Paper Award

Mr. Sanil Joseph, Senior Faculty, LAICO won the Best Paper award for his paper *Effectiveness of telemedicine in identifying diabetic retinopathy cases compared with usual referral* at the Annual Conference of Vision 2020 held in Pune from June 4 to 5, 2016.

IERG Best Poster Award

Ms. A. Divya, Proteomics Department, AMRF received the Best Poster Award for the presentation on *Aspergillus flavus infection induced changes in the proteome of human corneal epithelial cell line* at the 23rd Annual Meeting of Indian Eye Research Group (IERG) held at Hyderabad on July 30-31, 2016.



Dr. V. Mathangi and Dr. Soham Basak being felicitated at the annual day celebrations of Aravind-Madurai



Mr. Sanil Joseph receiving the Best Paper Award



Ms. G. Prakadeeswari receiving award for the best oral presentation

TNOA Quiz Winners

Dr. Sabyasachi Chakrabarty and Dr. Anubhuti Vyas, postgraduate students, Aravind-Tirunelveli won the quiz competition conducted as part of the Annual Conference of Tamil Nadu Ophthalmic Association held at Vellore from August 5-7, 2016.

Proficiency Awards - 2016

At the annual day celebrations of Aravind-Madurai, Dr. Soham Basak and Dr. V. Mathangi were honoured with Dr. G. Venkataswamy Endowment Award for securing the highest mark in the MS and DO examinations respectively.

Best Video Award

Dr. R. Venkatesh, Chief, Glaucoma Services, Aravind-Pondicherry won the Best Video Award for the video titled *Opportunistic Screening to Tackle Glaucoma* at the Annual Conference of the Glaucoma Society of India held at Himachal Pradesh from November 4-5, 2016.

Winner-Dinamalar Kolam Competition

Ms. K.R. Deepa, Housekeeping Supervisor, Aravind-Pondicherry participated and won second prize for the fourth consecutive year in the Kolam Competition organized by Dinamalar group in Pondicherry on December 18, 2016.

Best Case Presentation – ERUDIO 2016

Dr. Arkaprava Pradhan, postgraduate student, Aravind-Tirunelveli won the award for the best case presentation at ERUDIO 2016 held in New Delhi from January 7-8, 2017.

First Prize for Oral Presentation

Ms. G. Prakadeeswari, Junior Research Fellow, Department of Molecular Genetics, AMRF won first prize for her oral presentation titled *Association Study on*

homocysteine gene polymorphisms in southern Indian individuals with Pseudoexfoliation Syndrome at the Conference on Emerging Trends and New Challenges in Biotechnology held in Hosur from February 2-3, 2017.

Awards at the All India Ophthalmic Society Conference

Jaipur, February 16-19, 2017

- Dr. Karthik Srinivasan, Medical Officer, Retina-Vitreous Services, Aravind-Tirunelveli – Best Innovator Award (South Zone)
- Dr. Abhijit, Medical Consultant, Aravind-Tirunelveli and Dr. R. Sindhusree, Glaucoma Fellow, Aravind-Tirunelveli were awarded Fellow of All India Collegium of Ophthalmology
- The Retina-Vitreous Service team from Aravind-Coimbatore consisting of Dr. P. Sheth Vaneer, Fellow, Dr. George J Manayath, Medical Consultant, Dr. V.R. Saravanan, Medical Consultant and Dr. V. Narendran, Chief Medical Officer – Best Paper Award in Retina Session
- Dr. Siddharth Narendran, Medical Officer and Dr. Soham Basak, MS Resident from Aravind-Coimbatore – Third Prize in PG Thesis presentation
- Dr. Nilam Gohlil, Cornea Fellow, Aravind-Madurai – Best Poster Award in Cornea session
- Dr. Komal Mehta, Cornea Fellow, Aravind-Madurai
- Best Poster Award in the Community and Social Ophthalmology session.
- Dr. Kirandeep Kaur, and Dr. Surbhi Saboo, DNB Residents, Aravind-Pondicherry – winners of the IJO YOSI Essay writing Competition
- Dr. Girish Bharat Velis, Retina Fellow and Dr. Spurti G Reddy, Senior Resident, Aravind-Pondicherry – Best Poster Award
- Dr. Bhagya Sudheer, Uvea Fellow, Aravind-Madurai – Best Paper Award in Uvea session

ARAVIND EYE FOUNDATION

The Aravind Eye Foundation (AEF) was created in 2001 to support Dr. G. Venkataswamy's vision of eliminating needless blindness. With a growing network of advisors, volunteers, and donors, Aravind Eye Foundation seeks to promote Aravind's model of sustainable, quality, patient-centric healthcare to other NGOs, academic and healthcare organisations, social enterprises, and interested individuals. Aravind's main operations pay for themselves, thus the foundation focuses on areas where external support can be a catalyst for starting or expanding a programme.

Ring of Hope (ROH)

Each year in India, more than 1,500 children between the ages of zero and five are diagnosed with retinoblastoma, or cancer of the eye. The Ring of Hope fund pays for diagnosis and treatment, including surgery, chemotherapy, radiation, family counselling, custom-made prostheses, and genetic testing to determine whether future generations are likely to develop the disease. Since it was founded in 2004, the Ring of Hope has helped save the sight and lives of 452 children and paid for more than 4,000 patient visits. Apart from children, adults with ocular malignancies receive funding from ROH for diagnosis and treatment.

Among those fortunate to receive help from ROH is Ahalya. The child and her twin sister came to Aravind from their hometown in Kerala. Ahalya was diagnosed with cancer in both the eyes, and one eye had to be enucleated. The whole family was tested, and genetic

mutations were found in Ahalya and her mother. When Ahalya's baby sister was born, her parents brought her in for testing, when she was just five months old. Owing to early diagnosis, Aravind's doctors could start treatment at a very early stage, saving her sight and life. She is now four and a half years old and cancer-free. She will continue to come to Aravind for follow-up visits, until she is seven years of age.

Spectacles for Scholars programme

Aravind's Spectacles for Scholars programme provides free vision screening and eye glasses for school children, between the ages of five and 17, from underprivileged families in Tamil Nadu and Pondicherry, India. Aravind's unique all-classroom teacher method of screening ensures higher accuracy of diagnosis and compliance, because classroom teachers know their students personally and can detect vision problems effectively.

This year, Aravind screened 327,287 school children and distributed 11,007 pairs of spectacles. In addition, nearly 3,000 children with potentially blinding eye defects, such as retinoblastoma, juvenile cataracts, genetic glaucoma, amblyopia and strabismus, were identified, and more than 1,000 teachers were trained for vision screening.

Aravind Eye Foundation is grateful to the Madison Community Foundation Jaya G. Iyer Endowment Fund, the Umberto Romano and Clorinda Romano Foundation, the So-Hum Foundation, and Warby Parker for their support.

AEF team and Dr. Usha Kim with a Retinoblastoma patient



Ahalya with her younger sister and mother





A doctor examining a boy at a school children screening camp

Rural Vision Centres

Rural vision centres are at the heart of Aravind's strategy to bring primary eye care to one billion people by 2020. Each centre is staffed by a highly trained ophthalmic technician who provides eye examination and screening for different conditions, dispenses eye glasses, and treats minor ailments and injuries. Via Aravind's award-winning telemedicine system, patients are then examined by doctors at a base hospital. The Aravind Eye Foundation has funded 14 such centres, through the generous support of the JJ Keller Foundation, the So-Hum Foundation, and individual donors. Last year, these centres saw 97,915 patients, 5,118 were referred for cataract surgeries and 11,880 ordered eye glasses.

Research

Aravind inaugurated the Ocular Genetic Testing Centre at the Aravind Eye Hospital in Madurai with support

Dr. K. Tiruvengada Krishnan and Mr. A. Mohammed Gowth at Kisii Eye Hospital, Kisii, Kenya as part of Hilton Foundation project



Tele-consultation in progress at a rural vision centre

from the Allene Reuss Memorial Trust, the So-Hum Foundation, and individual donors. During the first year of operations, genetic analysis and counselling have been provided to 200 families with retinoblastoma (eye cancer), greatly improving the likelihood of early diagnosis and treatment. Genetic testing enables Aravind to predict the risk of retinoblastoma in a patient's siblings and offspring, as well as the risk of secondary cancers. Aravind offers the service at \$200 per test, compared to \$1400 per test in the US and Canada; patients throughout India and neighbouring countries will have access to the centre.

Capacity Building

Through LAICO, Aravind mentors hospitals throughout India and the developing world, adding roughly 800,000 surgeries per year and greatly improving the quality of patient care. The Conrad Hilton Foundation has awarded Aravind a second multi-year grant to continue capacity building work with hospitals in sub-Saharan Africa. Highly trained ophthalmic personnel is critical for both internal and external capacity building. Aravind received a seed grant and technology support from iEinstein to develop software to track trainee performance across multiple hospitals and to upgrade classroom equipment.

Aravind Eye Foundation is deeply grateful to the many supporters who share our founder's vision.



PARTNERS IN SERVICE

Aravind is, indeed, fortunate to be associated with a group of organisations and individuals, who support its various initiatives to restore vision to millions. Aravind's journey, spanning over four decades, would not have been possible without the wholehearted commitment of the organisations and individuals in sharing the organisation's mission. Aravind gratefully acknowledges their support and looks forward to a continuing partnership with them in its efforts to eliminate needless blindness.

For service delivery, training and more

- Acumen, USA
- Alcon Laboratories Inc, USA
- Canadian International Development Agency (CIDA)
- Carl Zeiss Meditec, Germany
- CBM International, Germany
- Centre for Innovation in Public Systems, Hyderabad, India
- Combat Blindness Foundation, USA
- Conrad N. Hilton Foundation, USA
- Dana Center, Johns Hopkins University, USA
- Essilor, India
- Fred Hollows Foundation, Australia
- T. H. Chan School of Public Health, Harvard University, USA
- Indian Institute of Management, Bengaluru, India
- Indian Overseas Bank, India
- International Agency for Prevention of Blindness, UK
- International Council of Ophthalmology, UK
- Kaushal Devendra Gupta, Pune, India
- Lavelle Fund for the Blind, USA
- Lions Clubs International Foundation, USA
- London School of Hygiene and Tropical Medicine, UK
- Manohar Devadoss, Chennai, India
- Narotam Sekhsaria Foundation, Mumbai
- ORBIS International, USA
- Rotary International, USA
- Schwab Foundation and Social Entrepreneurship, Switzerland
- Seva Foundation, USA
- Seva Service Society, Canada
- Shyam Prakash Gupta, Madurai, India
- SightLife, USA
- SightSavers, UK
- State Bank of India, India
- Standard Chartered Bank and Scope Intl., UK
- So-Hum Foundation, USA
- Subroto Bagchi, Bengaluru, India
- The Queen Elizabeth Diamond Jubilee Trust, UK
- Tirumala Tirupati Devasthanams, India
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- VISION 2020 - The Right to Sight, India
- Wescott Williams Ltd., UK
- World Association of Eye Hospitals, Netherlands
- World Diabetes Foundation, Denmark
- World Health Organization, Switzerland
- XOVA: Excellence in Ophthalmology Vision Award, USA

For research

- Alagappa University, Karaikudi, India
- All India Institute of Medical Sciences, New Delhi, India
- Council of Scientific and Industrial Research, New Delhi, India
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- Francis I. Proctor Foundation for Research in Ophthalmology, UCSF, USA
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- National Eye Institute, USA
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- Sichuan Academy of Medical Sciences and Sichuan Provincial Peoples Hospital, Sichuan, China
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