

ARAVIND EYE CARE SYSTEM: PROVIDING TOTAL EYE CARE TO THE RURAL POPULATION

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Aravind Eye Care System as of 2010 was the largest provider of eye care services in the world. It handled every day on an average 6000 outpatients, carried out between 850 to 1000 surgeries and conducted between four and five outreach camps that examined 1500 patients and transported 300 patients for surgery. The growth of Aravind Eye Care System was phenomenal but the mission for eliminating needless blindness set by its founder was an enormous task. The task was now enlarged to provide total eye care with the available evidence on the widespread prevalence of moderate visual impairment and also other eye related problems in rural areas. The eye camps reached only seven percent of the people having eye problems in villages and the top management at Aravind eye hospital was faced with the need to reach and cure a much larger percentage of the affected people in the rural areas.

FORMATION AND GROWTH

Dr Govindappa Venkataswamy started Aravind Eye Care System, as an eye clinic and an 11 bed hospital in 1976 with the idea of creating a sustainable eye care system. The clinic was located in Madurai city in the south Indian state of Tamil Nadu and a year later 23 more beds were added in another building referred internally as the Annexe. With its mission to serve poor blind people, at the same time a low-cost facility with 100 beds was added exclusively for those who required free treatment. This was a beginning to the contribution of restoring eyesight to the millions with poor vision.

Aravind Eye Care System included five hospitals which collectively performed more than 275,000 surgeries and laser procedures every year. In addition to the hospitals in Tamil Nadu it helped eye hospitals in Gujarat, Kolkata and Uttar Pradesh to develop management capabilities and then handed over these hospitals to the promoters. It grew by increasing its area of operation and also by increasing the range of eye care services offered. The eye care system included an eye bank, ophthalmic equipment and supplies manufacturing plant, a medical research foundation, community outreach programs, community based primary and secondary care eye clinics and education, training and consultancy services. The single Aravind eye hospital evolved into the Aravind Eye Care System that impacted a few hundred thousand every year. From April 2009 to March 2010, over 2.5 million persons have received outpatient care and over 300,000 have undergone eye surgeries at the Aravind Eye Hospitals at Madurai, Theni, Tirunelveli, Coimbatore and Puducherry.

ARAVIND APPROACH

Aravind's approach was to provide quality eye care at prices that everyone can afford. A core principle of the Aravind Eye Care System was to provide services to the rich and poor alike and still be financially self-supporting. It provided free eye care to two-thirds of its patients out of the revenue generated from the one third of the patients who paid for the services. Aravind culture was such that the service personnel were disciplined, accountable and responsive to patients. Over the years the respect and care shown to the patients irrespective of the category of the patient helped build its image and community trust.

The Aravind **approach** sought to restore eyesight to the millions with poor vision, eliminate needless blindness and correct moderate visual impairment, by providing high quality, high volume, and compassionate eye care to all.

SERVICES OFFERED

The Aravind approach required generating volumes to sustain and also grow. The growth was not only in numbers but also through expansion of the service mix. The service mix with its initial focus on cataract surgery was widened to multi speciality eye care. Specialities such as retina, cornea, glaucoma, paediatric ophthalmology, neuro-ophthalmology, uvea and low vision were added over time. The service was not limited to curable blindness. In the case of incurable blindness rehabilitation services were provided.

In addition to the services delivered by the hospitals it had extensive community outreach program. An important outreach program was the comprehensive eye screening camp. Four to five eye screening camps were organized in a district in any month. Surgeries were not done at the eye camp sites. Patients requiring surgery were taken to the hospital for surgery. There were different types of camps for different patient groups and also by the type of eye problem addressed. There was the paediatric eye camp to address congenital eye problems and eye problems of children. Eye camps for school children focused on refractive errors and squint eye. Work place screening camps were mostly for refractive errors for the benefit of employees in any kind of industries or corporate offices. Diabetic retinopathy camps for exclusive diabetic community to diagnose and prevent the loss of vision due to diabetic retinopathy and comprehensive eye screening camps examined for cataract, glaucoma, retina problems etc.

PRICING EYE CARE SERVICES

The patients who come to the “paying section” for eye care were charged at competitive rates. The charges were not more; often lower than what was charged for similar services available at other comparable hospitals in that location. As on 2010 the consultation fee for a patient was `50 (1 U.S. \$ = `44.37 approx in April 2011) and was valid for three months. The starting rate for cataract surgery was in-between `4,100 to `6,000. Phaco surgery was priced between `6,500 and `40,000 depending on the type of lens implanted and scale of comfort. Poor patients who come to the “free section” were not charged any consultation fee or for many of the surgical procedures not involving any expensive supplies. For Cataract surgery they were required to pay `750 essentially to cover the cost of the lens, consumables and post-operative medications for a month which was given to them at the time of discharge. For those who could not afford even this, it was waived by the doctor in charge at the out patients department.

Patients who were advised glasses had the option to buy from the spectacle shop located in the hospital. Price of glass and frame were usually less than what it would cost in an outside optical shop. The grinding of the glasses and their fitting were done in house while the patients wait and this saved the patients another trip to the hospital. The same applied to patients who were prescribed glasses in eye camps – they purchased the glasses and it was dispensed on the spot.

Recognizing that it was predominantly the very poor who come to eye camps, all the services were free including transportation to the base hospital, surgery, food, post-operative medications, transportation back and follow-up a month later at the camp site.

PROCESS THAT REFLECT ITS APPROACH

Aravind approach was supported by its efficient service operations. Its productivity levels were high because of volumes, technology and people. High quality service in large volumes resulted in low cost sustainable operation. The large volumes helped recover the costs of equipment faster compared to many small private practitioners. This also helped buy current technology and high quality equipment. It's motivated and loyal paramedics were recruited based on ability and attitude and provided with

very good training. The paramedics performed many of the routine clinical tasks and this increased the productivity of the doctors.

Managing the process was very important to manage costs of offering free service to two-thirds of the patients. Process innovations helped provide quality eye care at very economic price. The comparison of surgeon productivity indicated that it was 6 times compared to the surgeons elsewhere. In Aravind an ophthalmologist performed in-between 6 to 8 Intraocular Lens (IOL) surgeries per hour while it was one or two surgeries in the rest of the world.

Aravind had perfected some surgical techniques. These were refinements of procedures, rather than inventions. For example, Aravind had developed and perfected its own version of manual sutureless cataract surgery instead of the usual surgery done with suture or with the use of expensive equipment and instrumentation. This speeded up the surgical procedure. The productivity of the doctors was also increased as each surgeon worked on two operation tables alternately. There was a team of paramedics and junior doctors to wash the eye, to give injection and so on. The surgeon did his part and moved on to the next table.

The effective utilization of doctors was not limited to surgery alone. Trained paramedical staff did preliminary tests, refraction, scans, etc., rather than doctors doing them. The patients were examined by Resident Doctors who recorded the diagnosis and made recommendations, with the final disposal of the cases done by a medical officer. Tests that can be done by paramedical staff were left to them and in addition there were trained counsellors to help the patients to take informed decisions and respond to their questions relating to costs, treatment, etc. The doctors were therefore not required to spend time on routine tests or providing information to patients which could be done equally well by someone else and devoted their time mainly to medical advising. Aravind Eye Care System had six nurses for every doctor. In addition to this they had the counsellors.

There was a patient information brochure and in addition to this an “outpatient coordinator” was present to guide the outpatients. This helped the patient to negotiate through the hospital procedure smoothly and reduce their anxiety and disruption in the system. This contributed to service efficiency and patient satisfaction. Staff was rotated between the paying segment and the free segment every month or once in two months. This ensured responsive service to all categories of patients.

Planning for expected load ensured availability of resources. There was yearly, monthly and also planning for the next day. It was used to schedule patients, and deploy staff and equipment. It was also used to arrange for supplies and spares. Resource planning ensured that surgery was not postponed for want of supplies, surgeons etc.

Technology was used to enhance performance. Communication technology helped to make information available to the right personnel and this reduced the throughput time. The response time to complaints was also sought to be reduced through use of technologies. Registration was done using computers and it took about a minute for a patient to be registered. The computers were also used to generate the case sheets. The equipments used for eye care were of high quality but rooms were utilitarian.

Aurolab was established to produce quality products at affordable cost. Aurolab was established in 1992 to produce IOL to make quality cataract surgery affordable in developing countries. It reduced production costs and was able to price the IOL to less than 10 percent of the price of imported lens. Similarly it started manufacturing sutures at one fourth the price of imported sutures. These products were available worldwide to everyone and not just limited to Aravind keeping in line with its broader vision.

ORGANIZATION AND STAFFING

There are seven base hospitals (5 tertiary level and 2 secondary level base hospitals), five Community Eye Clinics and thirty six vision centres. Each of the community Eye Clinics had six staff members. These included an ophthalmologist, one refractionist (technician), one medical record staff, one senior paramedic and one counsellor. The vision centre had one refractionist and one counsellor. In addition to these fixed centres to reach out to the community, there was an organization for community outreach program. It comprised 6 camp managers, 26 camp organizers, and 8 administrative assistants. The staffing pattern was different for different types of camps (Annexure 1). Camp organizers had targets on the number of camps to be organized and number of beneficiaries (Annexure 2).

The strength of Aravind hospitals was its personnel. Doctors were an important resource. Retention of doctors was difficult as once they gained experience and reputation they moved to places where they got a higher offer. The compensation was designed to retain key staff and was generally based on market rates. Paramedics were critical to the functioning of the Aravind system. The primary focus in the recruitment and selection of paramedics was on value-fit. The paramedics were young girls who passed their pre-degree program and generally had a rural background. Young girls from the villages between ages of 17 and 19 and who had a certain amount of curiosity and a capacity for hard work were recruited. Girls from large families, farmers' families, and with the right attitude were preferred. The parents were also interviewed to understand the commitment levels. The advantage was that they were willing to stay on for a few years with the organization. Most of them continued with Aravind even after they got married because they were respected in the community. The recruitment and selection process identified candidates who empathized with the patients they served. They were trained for two years. They got a stipend of `1,000 in the first year and `1,200 in the second year. They got subsidized food and were provided residential accommodation. Residence was compulsory. They were paid `4,900 on confirmation. On an average they worked for five years. The drop out rates among the paramedics was 50 percent in four years time period. Training was on skill development to meet job requirements. The training was internal and therefore they did not get any certificates that can be used for finding jobs elsewhere and this increased the retention of paramedics.

EYE CARE SERVICE – THE BIG PICTURE

The availability of eye care service in India was limited with only one eye doctor for 100,000 population and was even less in rural areas. There were some districts that did not have an eye doctor at all. The National Programme for Control of Blindness (NPCB) was launched in 1976 as a Government of India scheme with the goal of reducing the prevalence of blindness from 1.4 percent to 0.3 percent. This program was one of the centrally sponsored schemes by Government of India. The NPCB implemented a plan for providing grant-in-aid for conducting free cataract operations to motivate many NGOs to assist in this endeavor. Monetary assistance was revised from time to time¹. All the camps which were conducted by Government or NGOs aimed to diagnose eye problems at the community level and refer those who needed secondary or tertiary care services. Surgeries cannot be performed in the community clinics or camps. Surgeries can be performed only in the base hospital. So Aravind conducted eye diagnostic camps and cataract patients were transported to base hospital on the camp day itself.

According to a survey in 2001-02, the prevalence of blindness was estimated at 1.1 percent. The target for the 10th Plan was to reduce this to 0.8 percent by 2007. A survey done in 2006-07 estimated the

¹ Srinivasan Aravind, Aravind HariPriya and B. Syeda Sumara Taranum; Cataract surgery and intraocular lens manufacturing in India, Current Opinion in Ophthalmology 2008, 19:60–65

prevalence of blindness at 1 percent ². Another study suggested the prevalence of moderate visual impairment of 8.09%. Most of the moderate visual impairment was caused by refractive error (45.8%) and then by cataract (39.9%). The moderate visual impairment was present in the higher age group, females, lower socioeconomic group and the rural population. The study suggested that by the year 2020, 139 million of the population in India were likely to have moderate visual impairment ³. The number of blind in India was estimated at 18.7 million in 2000 and projected to be 24.1 million in 2010 and 31.6 million in 2020⁴.

Performance of cataract surgery steadily increased in India from 3.9 million in 2002-03 to 5.9 million in 2008-09. The cataract surgical rate per million population in Tamil Nadu was 7,633 as against the national average of 4,425. Gujarat had the largest number of eye camps with even small hospitals doing eye camps. The cataract surgical rate per million population in Gujarat was 10,015 ⁵. In Tamil Nadu Aravind was one of the largest providers of eye care services. It conducted 167,747 cataract surgeries in 2009-10 as against 488,666 cataract surgeries performed in Tamil Nadu. The productivity in terms of number of surgeries was low for other hospitals compared to that of Aravind. The all India average was about 400 eye surgeries per doctor a year while it was about 2,600 in the case of Aravind.

EYE CARE MARKET

Indian population was prone to blindness because of cataract and diabetics. 50 to 60 percent of the blindness was because of cataract and 40 percent was because of other reasons.

Understanding and acceptance of eye care treatment was poor. Many people did not know that most of the cases of blindness can be cured or corrected. Also many patients were afraid of surgery and this was also one of the reasons for the poor response to the efforts to remove the backlog of blindness.

The other important reason for poor acceptance of eye care service among the rural population was the cost. As part of the community outreach program some of the patients were referred to the base hospital for further medical intervention and surgery. Even though these surgeries were free or offered at subsidized price, patients often did not make the trip to the base hospital as they cannot afford the cost of transport, the lost wages, food and accommodation. In addition to these they were also new to the town and had no guidance.

In a study conducted to understand predictors of eye camp attendance in rural areas it was observed that gender and distance were the significant predictors. Men were twice as likely as women to attend the camp and persons living 3 Kms or less from the eye camp were more likely to attend than those

² R. Jose, 2008, Present Status of the National Programme for Control of Blindness in India, Community Eye Health Journal | vol 21 issue 65 | march

³ R. Dandona, L. Dandona, M. Srinivas, P.Giridhar, M.N. Prasad, K. Vilas, C.A. McCarty, G.N.Rao, 2002, Moderate visual impairment in India: the Andhra Pradesh eye disease study, British Journal of Ophthalmology, Vol 86 issue 4, 373-377

⁴ Dandona R, Danadona L., 2001, Review of findings of the Andhra Pradesh Eye Disease Study: policy implications for eye-care services, Current Ophthalmology, vol 49, issue 4, 215-234

⁵ Srinivasan Aravind, Aravind Haripriya and B. Syeda Sumara Taranum; Cataract surgery and intraocular lens manufacturing in India, Current Opinion in Ophthalmology 2008, 19:60–65

living farther away. Age, literacy, publicity, the presence of people with good postoperative outcomes within a village, and economic status did not show significant association with eye camp attendance⁶.

The people affected by low vision included both the poor and also those who can afford and were willing to pay for the eye care service. According to a manager in Aravind, “the preference for Aravind Eye Care system by patients who pay for the service is because of the upgraded comprehensive eye care that includes speciality service not available from private practitioners. The patient is offered a wide range of services at different price levels from which the patient can make a choice. The referrals from ophthalmologists and physicians also add to the demand. Strong word of mouth helps in getting a large number of patients who are willing to pay and this influence bring in close to 70 percent of such patients. Quality, transparency of charges and service orientation create trust and increases the patients’ willing to pay for the services”.

SERVICE DELIVERY OPTIONS

Efficient service delivery was critical to eradicate needless blindness and treat other eye related problems, particularly in the rural areas. Aravind developed comprehensive service delivery models in the areas of diabetic retinopathy, glaucoma and paediatric ophthalmology. It also used tele-ophthalmology with remote consultations. Even with all these service delivery options eye camps were still important in rural areas. The service options examined here included base hospitals, community centres, vision centres, eye screening camps and mobile units.

Base hospitals

Aravind had five tertiary hospitals. 60 percent of the patients visiting these hospitals were from the nearby places. Each hospital had its own jurisdiction to organize outreach programme and expected walk in patients from those areas (Annexure 3).

Each base hospital was a teaching institute and well equipped to provide secondary and tertiary care services. It had different level of pricing to suit various levels of economy groups. Also it provided specialty treatment or surgery either free of cost or subsidized cost depending on the patients’ affordability.

There were secondary level base hospitals. Aravind had started its new branches in two district headquarters which were closer to Madurai and Coimbatore hospitals. One functioned at Dindigul and another at Tiruppur where cataract surgeries were performed.

On an average two-thirds of the cataract patients availed services free of cost. Of the 67 percent free patients 39 percent come through camps and 28 percent was walk-in. Even while walk-in patients were charged `750 for the cost of the implanted intraocular lens, there was an increase in the number of walk-in patients for cataract operation.

For smaller and newer hospitals of Aravind the number of patients willing to pay was less. In Theni the paying to free ratio was about 25:75. Theni had 170 beds and less than 60 patients pay and the rest were occupied by free patients.

⁶ Fletcher, A.E., Martine Donoghue, John Devavarman, R.D. Thulasiraj, Susana Scott, Mona Abdalla, C.A.K. Shanmugham and P. Balamurugan, 1999, Low uptake of eye services in rural India, Arch Ophthalmol, Vol 117, Oct.

Cataract surgeries were done for free for the patients who came through the camps. Camp patients who required specialty care (3% of the total OP) paid a subsidized fee for services obtained at the base hospital

Community centre clinics

There was one city centre and five community centre clinics. These eye clinics were established to reach consumers in the outlying areas. They served a location with population between 100,000 to 200,000. They were established within 50 kms of the base hospital for ease of management. The other considerations in selecting a location included:

- good access to the community centre from nearby villages
- absence of other eye hospital or doctor in that location
- prior outreach work carried out to ensure familiarity with and positive image of Aravind.
- availability of other health care facilities including general physicians, medical shops and health care NGOs.

Each centre had an ophthalmologist and support staff. The consultation fee was Rs 30. The investment required was the same as for the vision centre, about `800,000 to `1,000,000 but the recurring expenses increased because of the larger staff size. 40 percent of the patients referred from the community centre for surgery, pay for the service. The performance of Melur Community Centre is given in Annexure 4.

Vision centres

These were primary eye care centres established in locations with population size of about 50,000 within a five km. radius and about one hundred thousand within a ten km. radius. Aravind established 36 such centres. The objectives of the vision centre were to:

- Provide comprehensive and quality eye care at a location close to the target rural population by trained staff and through the use of tele-ophthalmology
- Collaborate with the community to create awareness and educate on eye care.
- To develop a sustainable fixed location approach to eye care service delivery.

The consultation charge at the vision centre was `20. The vision centre was economically advantageous to the patient as it saved costs of transportation, other expenses and lost wages. It was estimated that a visit to the hospital would cost on an average `350 while it was only `120 to visit the Vision Centre, a saving of `230.

These centres were equipped with basic ophthalmic equipment like Slit Lamp, Streak Retinoscope, Direct Ophthalmoscope, Trial sets, SchiottzTonometer, Basic sterilizers, BP apparatus and 90D Lens and a computer with a digital camera (in the place of webcam) and internet connectivity. It was manned by a coordinator and a technician. The coordinator was also the counsellor. The technician was a trained ophthalmic assistant who performed slit lamp examination, refraction, treating minor ailments etc. The centre was linked to the base hospital through wireless networks. Once the technician completed the examination and tests, each patient examined in the Vision Centre interacted with an ophthalmologist through the video conferencing facility. Tele ophthalmology enabled a doctor from one end to interact with the patients sitting at a remote end in a faraway place through video conferencing, share data through computers and diagnose the patient with the help of local technicians who used ophthalmic diagnostic equipments to transfer the images. Patients who required procedural

intervention were required to travel to the hospital. 90 percent of the patients were treated at the centre itself while about 10 percent of the cases were asked to visit the base hospital for surgery and treatment. In addition to the counsellor and technician there were one or two field workers. Field workers created awareness about the eye problems in the community, contacted potential patients and referred them to the centre. They also arranged eye camps.

Vision Centre was the branch of outreach activity. The outreach department was given the task for start of any new centre in terms of analyzing the market potential and establishing the centre in coordination with respective departments internally and the local community. Outreach department had the responsibility to promote the service of Vision Centres. The investment required for a vision centre was `800,000 to `1,000,000. The recurring expenditure was usually recovered after it was in operation for 2 years. The vision centres were viable as indicated by the positive net income in four of the five vision centre under the Madurai Hospital (Table 1). The penetration of service by different vision centres is given in Annexure 5.

Screening eye camps

Through eye camps, medical teams from each of the Aravind's hospital reached out to patients in rural areas. 2,148 camps were organised in 2009-10. 455,378 patients were screened and 76,056 surgeries were carried out and 77,618 eye glasses provided. One of the aspects that influenced the number of camps organized was the hospital capacity and its utilization. 4 to 5 camps were organised in a district in a month by Aravind.

The eye camps were useful to generate demand and mobilize community resources to assist service delivery. It also helped build image. It was observed that after two months of performing a free eye camp the paying segment in that area increased. Comprehensive eye screening camps also attracted paying patients to the hospital through enhanced awareness and trust. In 2009-10 33 percent of the 189,461 cataract surgeries were of patients who paid for the surgery and the rest were free surgeries. Of the remaining 67 percent of free cataract surgeries 39 percent came through camps and they did not pay anything (zero cost to patients) but the NGO was eligible for grant-in-aid of `625 for each cataract surgery under NPCB. In the case of all 285,967 surgeries (including cataract surgeries), 47 percent of the patients paid for the surgery. Of the remaining 53 percent free surgeries 27 percent were originally identified in camps (table 2).

The camps were usually held on Saturdays and Sundays. The camps opened in the morning and local volunteers assisted in the registration. Identity cards and case sheets were generated and the paramedical staff did the tests and this was followed by an examination by the doctor. Glasses were provided in the camp site itself, and those prescribed glasses bought them on-site. In case the right type of glasses was not available these were delivered in a week's time.

At the screening camps, the outpatients may be advised surgery at the hospital. As many were reluctant to visit the hospital on their own, they were taken to the hospital either through a hired bus or by public transport accompanied by an Aravind staff. Lunch was provided for those who were taken to the hospital for surgery. Aravind eye hospitals emphasized on follow-up of the eye camps after the surgery. The follow-up camp date was announced to the patients before they left the hospital after surgery. 90 percent of the patients came for the follow-up camp where a team from the hospital checked the post operative vision.

The teams from Aravind worked closely with local community leaders and service groups to organize the camps. Community participation created ownership of the program and ensured good response and acceptance in the community besides contributing to cost reduction by providing support

facilities. The eye camp partners included organizations like Lions, Rotary etc., religious organizations, education institutions, youth welfare associations, banks, industries, trusts, Cooperative societies, Panchayats and also individuals. Responsibility of the sponsor included identification of the location, arranging building and water and other support facilities, publicity, planning transportation of patients and medical team hospitality (Annexure 6). The responsibility of the hospital included medical team transport, diagnosis and treatment, inpatient food and transport, surgery and consumables, post operative care and follow up care.

The camps varied in size with the small camps catering to 300 outpatients and 60 inpatients, medium camps serving 600 outpatients and between 60 to 100 inpatients. The major camps generally had 1000 outpatients and 100 to 200 inpatients. The budget for small camps was `8,160. The budget included cost of publicity, patients lunch and travel from camp site to hospital, medical team cost of boarding and lodging and volunteers refreshments etc. The cost of these for the medium size camp was `17,470 and for major camps was `53,500. The cost and productivity of two small camps are indicated in Annexure 7.

In the initial stages Aravind organised camps on its own but as numbers increased there was need for external funding. Under the National Program for Control of Blindness (NPCB) scheme `750 was made available by the Government to the NGO sponsoring the IOL surgery. Of the `750, `625 was for the surgery and `125 was for glasses. The surgery was performed by the hospital and claim was made from the Government for `625 and the patients were advised to buy glasses outside.

The number of patients in a camp depended on the location and its potential as also the sponsor and their effort. The number of patients screened for surgery was sometimes as low as 15 to 20 and it went up to 250. In case the camps were organised at locations far from the base hospital then larger number of patients were required to make them viable. Camps organized by Theni base hospital averaged 35 to 40 patients and the camps organized by Madurai base hospital averaged 85 patients identified for surgery. The population in the area considered for a medium size camp was about 50,000. Of this 20 percent were in the high or middle income group and who generally did not prefer to attend an eye camp. The effective population was 40,000 and of this about 8% needed glasses. This worked out to 3,200 persons and out of this about 10% was already having glasses and this provided a population of 2,880 who were potential patients.

The challenges faced in the outreach programs included the need to promote community participation and retention of community partners. Maintaining quality of service in camps was also difficult but this was important to sustain the outreach program. A study on the use of eye services in rural India indicated that only 6.8 percent of the 749 adults with an eye problem attended eye camps covering 48 villages. The study was conducted in the area of operation of Aravind hospitals. Fear (principally of eye damage), cost (direct and indirect), family responsibilities, old age (treatment in old age was not worthwhile), god's will, and an attitude of being able to cope (with low or no vision) were the principal barriers to attending the eye camps⁷.

Mobile Unit

The World Diabetic Foundation funded a mobile unit of Aravind hospitals with a grant of `5 million, which included the cost of vehicle, equipment, and maintenance. ISRO provided the Vsat connection.

⁷ Fletcher, A.E., Martine Donoghue, John Devavarman, R.D. Thulasiraj, Susana Scott, Mona Abdalla, C.A.K. Shanmugham and P. Balamurugan, 1999, Low uptake of eye services in rural India, Arch Ophthalmol, Vol 117, Oct.

The mobile unit was equipped to take digital fundus image to help detect diabetic retinopathy. Software was developed for transfer of images to the base hospital from the mobile unit. The report was available in 15 minutes and the patients avoided travel and saved time. Only patients requiring surgical intervention needed to come to the hospital. The mobile clinic had a capacity to serve 75 patients a day. The running cost for the van was `4,000 to `5,000 a day. It was used since 2003.

Refraction Van: A pilot mobile refraction unit (MRU) attached to the Theni hospital was introduced in the beginning of 2010. It was a van equipped with refraction unit and spectacle dispensing unit to address uncorrected refractive error in rural areas and serviced by Theni hospital. A village was identified and the camp was organized with the help of a sponsor. The role of sponsor and of Aravind eye hospital is given in the table 3.

The team comprised a camp coordinator, a senior and a junior refractionist, an optical sales staff, an optical edging staff, one field staff and a driver.

The village was identified based on its suitability. The village was to have a minimum of 1000 population, not served by eye care providers and without good access to public transportation. This village need to be also easily accessible to 4 or 5 other villages and therefore the target population was 5,000. The sponsor had to arrange two rooms with power supply, a table and few chairs and benches. Handbills (about 2000) were distributed about two days prior to the camp by field staff from the nearest vision centre. Sometimes loudspeaker was used to announce in village festivals. Word-of-mouth by village headman and officers were an important method of promoting the MRU camp.

The MRU carried about 120 frames and 350 pairs of plastic lenses. The frames were priced at rupees 100 upwards, single lens vision at rupees 150 and above. 30 percent spectacles were ready made spectacles, 40 percent were custom-made spectacles, edged, fitted and delivered on the spot and 30 percent prescription lenses were processed and fitted at the hospital and delivered within one week to the vision centre nearest to the camp. Patients requiring primary examination or treatment were referred to the nearest vision centres and those requiring advanced examination were referred to the base hospital at Theni. Between March to June 2010, 19 MRU camps were conducted in Theni district. The revenue and costs of an MRU is given in table 4.

CREATING AWARENESS AND ACCEPTANCE

The community outreach program created awareness on the importance and need for eye care. It educated the population on the problems causing blindness and use of eye care services to restore vision in most of the cases. The methods used in the outreach program included distribution of handbills (small notices), posters, publicity boards in street corners, shop hoardings, bus stops etc, loudspeaker announcement (considered the most effective), cable TV, referral through local doctors, teachers, other NGOs, village leaders etc.

The hospital had a team of camp organizers. Each organizer was responsible for 1 or 2 districts. The camp organizer planned for a year estimating the patients to be serviced based on population and incidence of blindness in the area. The camp organizers planned the eye camp and identified sponsors to support these camps.

A study was conducted to compare effectiveness of alternative intervention strategies for increasing awareness and acceptance of cataract surgery. The intervention strategies included four health education approaches and two options for economic incentives. The health education approaches were:

- House to house visits by patients who had been successfully operated on for cataract. They were recruited and trained to screen and motivate patients with cataract.
- House to house visits by a basic eye health worker.
- Screening camps at a central location in a village. Advance information provided by distribution of hand bills to every household informing villagers about eye camps and announcing the date of the camp.
- Campaign at weekly market places by field workers using video display from van and use of loudspeakers and posters. Self-selecting persons with no individual attempts at persuasion had their eyes examined at the location. Visit was made on market day for four consecutive weeks.

The economic incentives studied were:

- Partial incentive: Free surgery and free eye glasses
- Full incentive: In addition to free surgery and free eyeglasses, free transportation to the hospital and free meals during the hospital stay were offered.

Approximately 8 months after intervention, the villages where the interventions were carried out were studied for cataract surgery awareness and surgical acceptance. Surgical awareness levels were found to be not significantly different except for the intervention that used screening van sites. Surgical acceptance defined as those operated on after the interventions indicated that the intervention that used “a villager with sight restored by cataract operation to promote and with full economic incentive” was the most effective. When only partial incentive was offered along with the four options of educating on cataract surgery, acceptance rates were much lower⁸.

ISSUES FOR CONSIDERATION

Aravind experimented and innovated on service operations and tried options for service delivery. The number of patients served by Aravind eye care service grew substantially but the percentage of rural population served was still very low⁹. In spite of enormous work done through outreach, the uptake was not even 10% of the population who need eye care while the camps were organized in the rural community. The manager of the outreach program was required to examine options to bridge this enormous gap in service to the rural population and present a solution to the top management of Aravind Eye Care system. From past experience the manager realised that providing access to service alone was insufficient to meet the objective of making a substantial impact on reducing needless blindness among villagers and to mitigate moderate visual impairment. Lack of priority for eye care among rural population, poor acceptance of eye treatment and fear of surgery were also major obstacles to use of eye care services. This possibly required creating awareness on the importance of eye care, increasing the acceptance of the eye care services among the rural population along with providing improved access to eye care service.

⁸ Brilliant G.E., James M. Lepowski, Beatriz Zurita and R.D. Thulasiraj, 1991, Social Determinants of Cataract Surgery Utilization in South India, Arch Ophthalmol, Vol 109, April.

⁹ Fletcher, A.E., Martine Donoghue, John Devavarman, R.D. Thulasiraj, Susana Scott, Mona Abdalla, C.A.K. Shanmugham and P. Balamurugan, 1999, Low uptake of eye services in rural India, Arch Ophthalmol, Vol 117, Oct

Table 1: Annual Net Income of few Vision Centres under Madurai Hospital

Item	Alanganallur	Gandhigramam	Rameswaram	Sholavandan	Thirupuvanam
Income (in `)	484,183	563,988	554,097	472,342	394,816
Expenditure (in `)	463,963	548,653	562,741	463,595	394,624
Surplus (in `)	20,219	15,335	(8,644)	8,748	192

Source: Organization records

Table 2: Type and source of patients undergoing eye surgeries in 2009-10

Type and Source of patients	Cataract Surgeries	All surgeries
Paying hospital:(different level of pricing packages)	62,625	135,225
Free hospital: (subsidised price to meet the consumables)	53,779	74,661
Camp: total free of cost	73057	76,081
Total	189,461	285,967

Source: Organization records

Table 3: Roles of sponsor and Aravind Hospitals in organizing an MRU camp

Sponsor/Supporter	Aravind Eye Hospitals
Providing place	Clinical team from base hospital
Power supply	Printing of handbills
Sponsoring and ensuring publicity	Door to door distribution of handbills
Local support	Transportation of medical team
Mobilizing volunteers to help during the camp	Food and refreshment expenses for the medical team
	Expenses related to the Mobile Refraction Unit

Source: Organization records

Table 4: Revenue and Costs for a MRU camp

S. No.	Item	Value
1.	Total Cost of the van	` 2,800,000
2	Life time of the equipments	5 years
3	Total possible expenses for the mobile refraction unit per camp	` 3376
4	Current average sales of spectacles per camp	20
5	Average sales price per spectacles	` 260
6	Purchase cost of frames and lenses for the spectacles	` 100

Source: Organization records

Annexure 1

Staffing pattern for camps

Items/ Type of staff		Type of camp		
		Small	Medium	Large
Expected out-patients		200-300	300-500	500-800
Expected in-patients		40-60	60-100	100-150
Doctors (Senior and Junior)		1+1	1+2	2+2
PMOAs	Preliminary vision	1	2	3
	Tension and duct	1	2	3
	Refraction	2	3	4
Patient Counsellor		1	1	1+1
Optician (Sales and Delivery)		1	1	2
Optical Technician (Edging and Finishing)		1	2	2
Camp organizer		1	1	1+1

Source: Organization records

Annexure 2

Target per Organizer per year approximately for 1 to 2 million populations

Type of Outreach	Camps/ year	Outpatients	Outcome
Eye Screening Camps (Around 40 years and above)	45 camps	250-300* OP per camp	20-25% of OP admitted for Cataract (ensuring the total camp target achieves the CSR** 1000 – 2000 in its service area) 15 % of OP receive eye glasses and 5-10 % of OP diagnosed with Specialty problems
Diabetic Retinopathy Screening Camp (all diabetic or 40+)	2 - 3 camps	200-250 OP/camp	40 - 50 % of OP as self reported or undiagnosed Diabetic. 15 to 20% of Diab.with Diabetic Retinopathy
Workplace Screening Camps (30-50 yrs.)	10 camps	150-200 employees/ camp	35 % of employees to get eye glasses to correct refractive error
School Screening Camps (6-15 yrs.)	10 schools	750-1000 strength/ School	4-5 % of the strength to get eye glasses
Paediatric Screening Camps (0-5 yrs.)	2 – 3 camps	100 Children	About 5% percent with Childhood blindness (excluding Refractive Error)

Source: Organization records

*Small camps the population in the identified area is 25,000. 20% is usually in the high and middle income that does not prefer to attend the camp. Of the 20,000 population 8% have visual impairment and may need glasses. 10% are normally already served and the potential patients is therefore 1440.

**CSR: cataract Surgery Rate i.e. number of surgeries for a million population per year

Annexure 3

Aravind's Infrastructure and Surgeries performed in 2009-10

Base Hospital	Infrastructure		Popln. In Million	All Surgeries performed 2009-10			
				Base Hospital (Paying walk in)	Base Hospital (Free walk in)	Outreach (Free)	Total
Madurai	Secondary Care Hospital	1	26.7	58,620	31,314	29,321	119,255
	City centre	1					
	Community clinics	2					
	Vision centres	13					
Theni	Community clinics	1	4.1	5,107	2,633	2,963	10,703
	Vision centres	8					
Tirunelveli	Community clinics	1	15.1	20,312	9,503	11,294	41,109
	Vision centres	5					
Coimbatore	Secondary Care Hospital	1	27.1	33,175	22,376	18,583	74,134
	Vision centres	5					
Pondicherry	Vision centres	5	21.6	18,011	8,835	13,920	40,766
Total			94.6	135,225	74,661	76,081	285,967

Source: Organization records

Annexure 4

Performance of a Community Centre 2009 vs 2010 (Melur Branch as a case)

Items	April 2008 – March 2009	April 2009 – March 2010
No. of Staff	8	8
New OP	12,160	12,447
Review OP	6,315	6,305
Total OP	18,475	18,752
Free IP	367	421
Paying IP	253	310
Total IP	620	731
Optical Prescribed	2,416	2,638
Optical Ordered	2,397	2,572

Source: Organization records

Annexure 5

Penetration of Services by Vision Centres in 2009-10

2009-10	Madurai	Theni	Tirunelveli	Coimbatore	Pondy	Total
No. of VCs	8	8	5	5	5	31
OP seen (New)	31,353	29,311	22,286	15,768	12,645	111,363
Glasses Delivrd.	6,789	6,394	4,684	3,270	2,749	23,886
Total Surgery	1,895	1,264	871	843	433	5,306
Target Popln	400,000	400,000	250,000	250,000	250,000	1,550,000
Popln.in Million	0.40	0.40	0.25	0.25	0.25	1.55
Eye Care Need (20%)	80,000	80,000	50,000	50,000	50,000	310,000
CSR	4,738	3,160	3,484	3,372	1,732	3,423
OP Coverage	39%	37%	45%	32%	25%	36%

Note: Few centres have started after March 2010

Source: Organization records

Annexure 6

Aravind hospitals guide to sponsor of eye screening camp

Any individual or voluntary social service organisation – such as Lions, Rotary, religious groups, industries, trusts, banks, hospitals, rural service organisations, recreation clubs, farmers associations, panchayat presidents – interested in the community welfare may sponsor an eye camp.

Sponsors' Role

The sponsors should play the primary role in setting up the campsite, arranging facilities and publicising the camp. They are responsible for assembling patients and providing lodging and food for the medical team.

How to sponsor a camp?

A village with a population of at least thirty to fifty thousand including the surrounding areas is selected for conducting an eye camp. A convenient venue (such as a large school building in the area) and a suitable date (which does not interfere with local festivals, marriages and other functions or with other camps) will be selected for conducting the camp.

The sponsors should:

- Plan for manpower and finance to conduct widespread publicity through all possible media.
- Delegate a separate team of members and volunteers to look after the publicity work
- Arrange boarding and lodging for the medical team if the location is beyond 125km from the base hospital
- Arrange transport for patients between the villages and the site of the camp, if the camp venue is not accessible to a radius of 5 to 10 Kms

Annexure 7

Cost and productivity in screening eye camp

Place	Total Expenses (in `)	Expected outcome		Unit cost as per target (`)		Actual outcome		Actual cost to find (`)	
		OP	Admission	OP	Admission	OP	Admission	OP	Admission
Kattur (July 26, 2009)	14,490	600	150	24	97	701	198	21	73
Chekkanurani (July 26, 2009)	8,685	300	50	29	174	142	21	61	414

Source: Organization records