

Integrated model of primary and secondary eye care for underserved rural areas: The L V Prasad Eye Institute experience

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Blindness is a major global public health problem and recent estimates from World Health Organization (WHO) showed that in India there were 62 million visually impaired, of whom 8 million are blind. The Andhra Pradesh Eye Disease Study (APEDS) provided a comprehensive estimate for prevalence and causes of blindness for the state of Andhra Pradesh (AP). It also highlighted that uptake of services was also an issue, predominantly among lower socio-economic groups, women, and rural populations. On the basis of this analysis, L V Prasad Eye Institute (LVPEI) developed a pyramidal model of eye care delivery. This article describes the LVPEI eye care delivery model. The article discusses infrastructure development, human resource development, and service delivery (including prevention and promotion) in the context of primary and secondary care service delivery in rural areas. The article also alludes to opportunities for research at these levels of service delivery and the amenability of the evidence generated at these levels of the LVPEI eye health pyramid for advocacy and policy planning. In addition, management issues related to the sustainability of service delivery in rural areas are discussed. The article highlights the key factors required for the success of the LVPEI rural service delivery model and discusses challenges that need to be overcome to replicate the model. The article concludes by noting the potential to convert these challenges into opportunities by integrating certain aspects of the existing healthcare system into the model. Examples include screening of diabetes and diabetic retinopathy in order to promote higher community participation. The results of such integration can serve as evidence for advocacy and policy.

Key words: Comprehensive eye care, eye care model, pyramidal model

Blindness in India and Andhra Pradesh Eye Disease Study

Blindness is a major global public health problem, with India carrying a disproportionately large share. In order to tackle the problem, a global initiative to eliminate avoidable blindness, VISION 2020: The Right to Sight was launched in 1999.^[1] Recent estimates from the World Health Organization (WHO) showed that there are 285 million visually impaired (VI) of whom 39 million are blind.^[2] Estimates for India were 62 million VI, of whom 8 million are blind.^[2]

The Government of India's strategy to control blindness took shape in 1978 with the launch of the National Program for Control of Blindness.^[3] At the time, the estimated prevalence of blindness in India was 1.49%, with an estimated 9 million blind people and 45 million people with VI.^[4] This effort was followed by a major national survey in the years 1986–1989, which showed that the prevalence of blindness was 1.5%, with an estimated 12 million blind people.^[5] This survey indicated clearly that cataract was responsible for 80% of all blindness. A World Bank grant to tackle the problem of cataract blindness helped initiate a project in the seven most populous states of India (Maharashtra, Uttar Pradesh, Madhya Pradesh, Orissa, Rajasthan, Andhra Pradesh, and Tamil Nadu).^[5] The main goal

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of the project was to bring down the prevalence of blindness from 1.5% to 0.3% by the year 2000. This decrease in prevalence of blindness was tied to a corresponding increase in the number of cataract surgeries performed to 3–4 million annually.^[5] Subsequently, in the years 1996–2000, the Andhra Pradesh Eye Disease Study (APEDS) was conducted in the state of Andhra Pradesh (AP) by L V Prasad Eye Institute (LVPEI) to obtain baseline information that would inform long-term strategies to control blindness in the state. This study found the prevalence of blindness to be 1.84%, with 10% of this attributable to visual field constriction.^[6] Similarly, the prevalence of moderate visual impairment (MVI) was found to be 8.1%, with nearly 1% due to visual field constriction.^[7] Both blindness and MVI was higher in rural areas.^[6,7]

Cataract and uncorrected refractive errors were found to be the major causes of blindness and were responsible for 60.3% of the total blindness and 85.7% of MVI.^[6,7] In addition, approximately 20–40% of the eyes remained blind postcataract surgery.^[8,9] Uptake of services was also an issue, predominantly among lower socio-economic populations, women, and rural populations. Certain cultural factors also contributed to the poor uptake of services. On the basis of this analysis, LVPEI developed a pyramidal model of eye care delivery. This model is based on the goal of delivering excellent, efficient and equitable eye care services and making them available, affordable, and accessible to all sections of community, irrespective of their ability to pay.^[10]

One of the issues with the magnitude of blindness in India has been the definition used in these different studies in India in past and the problem compounds when we compare it with other studies and those used by WHO.

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The L. V. Prasad Eye Institute Pyramidal Model of Eye Care Service Delivery

The LVPEI pyramidal model for eye care delivery is a tiered structure developed through a top down approach and functioning as community-based model [Fig. 1]. The bottom three levels of the model provide eye care service delivery in underserved rural areas with its high quality, comprehensive eye care to all people using a strategically constituted 'eye care team'.

At the bottom of the pyramid are Vision Health Guardians (VHGs), who serve a population of 5000. VHGs are drawn from the community they serve and are either volunteers or receive a small honorarium. They are trained locally for a period of 2 weeks in all aspects of primary eye care and some aspects of primary health care. The main task of VHGs is to create community awareness, conduct school and community screenings, distribute spectacles, screen for diabetes and hypertension, and work in coordination with other cadres of community health workers (in the areas of maternal and child health, immunization, water and sanitation, etc.). This integration of primary eye care with primary health care by involving VHGs in rural India is a promising concept. In the long term, communities are expected to take ownership of health promotion and monitoring and develop innovative, locally specific models for delivery of health care.

On a pilot basis, LVPEI integrated eye health screening with community development initiatives in a remote village (Ada) in Jainath mandal (a subunit of a district) of Adilabad district, in the northern part of AP in India.^[11] VHGs screened the entire village for eye diseases, diabetes, and hypertension. Some of the novel community development initiatives included development of vision gardens (by growing sweet potato, papaya, drumstick, and curry leaf plants as sources of beta carotene) and livelihood support in the form of vocational training by VHGs in collaboration with Nongovernmental Organizations (NGOs). Based on the results of the pilot, the Community Linked Initiative Project (CLIP) has been initiated to replicate the work across Jainath mandal (with a population of around 40,000) with the help of VHGs. This project is being implemented in collaboration with Operation Eyesight

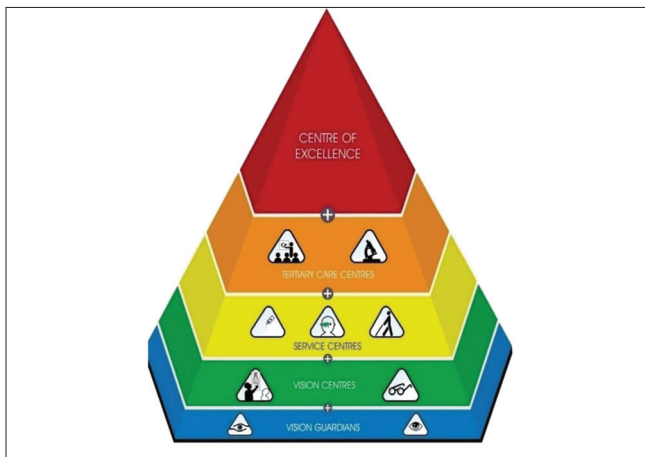


Figure 1: L V Prasad eye institute pyramidal model for eye care service delivery

Universal (OEU).

The next tier comprises the Vision Center (VC) network, which is a primary care service delivery unit for a population of 50,000. A VC is managed by a Vision Technician (VT), a high school graduate with 1 year of basic training in optometry. The VT is usually identified from the local district and after training is usually posted in the same district. The VTs main function includes the "3Rs", that is, refraction, recognition, and referral. The VT works in tandem with the community eye care (CEC) team, including the VHGs, to develop horizontal linkages and identify opportunities to expand the reach and impact of primary level interventions. For instance, LVPEI is currently piloting a model to identify glaucoma and diabetic retinopathy at the primary level, which could potentially lead to early diagnosis and limit their blinding impact. Each VC is linked to a network of 10 VHGs. In addition, a VC is linked to a Service Center (SC).

The next tier is composed of a "SC", which is a secondary level eye care unit for a population of 500,000. A SC relies on a comprehensive eye care approach.^[12] Each hospital is managed by a team of 20–25 eye care personnel and the main function at this level is provision of comprehensive eye care examination services, diagnosis and treatment of all eye conditions, provision of surgical services for cataract, primary glaucoma, corneal tears, and nonblinding eye conditions like pterygium, naso-lacrimal duct blockage, and laser for glaucoma and retina. In addition, a SC also provides low vision and rehabilitation services. Each SC is linked to a cluster of 10 VCs.

This network of 100 VHGs, 10 VCs, and 1 SC for a population of 500,000 is also known as a Village Vision Complex (VVC). The VVC is an example of an integrated model of primary and secondary care service delivery. At present, LVPEI established 10 SCs and more than 88 VCs thus far.

The top two tiers of the model are represented by the Tertiary Center (TC), which serves a population of 5 million, and a Center of Excellence (COE), which serves a population of 50 million. These centers are located in urban areas and provide tertiary level care, training for all cadres of eye care personnel, eye banking services, low vision and rehabilitation services, and also conduct research. The TC and the COE are also involved in eye health advocacy, policy, and planning.

The L. V. Prasad Eye Institute Model of Comprehensive Eye Care Service Delivery

Infrastructure development

Of the 10 SCs, LVPEI has overseen the entire design and construction of 7 from blueprint to completion. The LVPEI staff has worked on all aspects of infrastructure development, with the help of architectural and civil engineering consultants. Each SC has well demarcated areas for out-patient and in-patient care services, an operating room complex, an administrative area and a support service area. LVPEI has also been involved in the establishment of over 88 VCs in rural areas of Andhra Pradesh. A VC is typically located in rented premises. LVPEI identifies the location and sets up the primary eye care clinic.

Human resource development

LVPEI has developed training programs for the development

of all cadres of personnel required at an SC or VC. These programs address the training requirements of ophthalmic assistants or VTs, operating room technicians, ophthalmic nurse assistants and ophthalmic nurses, and bio-medical technicians. LVPEI also trains administrators, medical records and stores personnel and patient counselors. The ophthalmologists at LVPEI secondary level eye care centers are typically enrolled in LVPEI's comprehensive ophthalmology fellowship program and are posted at the secondary centers for a year once they complete a year of training at the LVPEI COE or a TC. All of them undergo an orientation program prior to their posting. The training programs range from 6 months to 1 year. Apart from this, there is ongoing refresher training for all cadres of eye care professionals.

Service delivery

LVPEI provides a comprehensive eye examination service, which includes diagnosis and treatment of all eye conditions, surgical services for cataracts, and other blinding and nonblinding eye conditions. At VCs, LVPEI offers comprehensive eye examination but without dilatation. Both secondary centers and VCs sell prescription glasses (made to order). Vision rehabilitation services are provided after the visually impaired person is examined at the secondary center. VCs do not charge for the eye examination service while secondary centers offer a tiered system of payment for services (including no charge for those unable to pay). There are two tiers of paid service for out-patients and three tiers for in-patients. Those who cannot be managed at this level are referred to the TC or COE.

Prevention and promotion

Promotion of eye health and prevention of eye diseases is an integral part of the network. CEC teams work in tandem with both the SC and VC to promote eye health and awareness of eye conditions and help prevent blindness and alleviate visual impairment. Health promotion activities include display of posters for awareness of eye health, nutritional blindness, ocular infections, diabetes, diabetic retinopathy, glaucoma, eye donation, etc., and rallies on the occasion of the World Sight Day, Glaucoma Awareness Week, Eye Donation Fortnight, World Diabetes Day, and Children's Day. Health promotion principles and counseling, as mentioned in the Ottawa Charter, are followed.^[13]

Research

Research is an integral part of the VVC and provides evidence for advocacy, planning, and policymaking. The VVC for the most part contributes to epidemiological and operational research. Apart from APEDS, numerous Rapid Assessment (RA) studies have been conducted to identify the prevalence and causes of blindness, confirm the outcomes of interventions and understand the barriers for uptake of eye care services.^[14-17] Similarly, operational research involves measurement of patient satisfaction^[18] and testing of new models for delivery of eye care services.^[19] Research to identify incidence and natural history of major eye diseases, social determinants of uptake of eye care services, models for screening for diseases like glaucoma and diabetic retinopathy, are ongoing. Research priorities for facilitating advocacy and policy changes have also been identified.

Monitoring and evaluation

Monitoring takes place in both centralized and localized formats. Centralized monitoring from the International Center for Advancement of Rural Eye care (ICARE) headquarters in Hyderabad involves daily, monthly, quarterly, and yearly reporting of activities, outputs and outcomes. In terms of day-to-day monitoring, the organogram of the VVC outlines the reporting structure [Fig. 2]. The VTs are monitored in several ways. The VC administrator monitors the administrative aspects, including physical infrastructure, upkeep of the instruments, medical record keeping, etc., of the VCs and integrates activities of the VC and CEC teams. The clinical skills of a VT are also assessed once every six months (on average). At the VVC level, the SC administrators and the VC administrators are monitored by a VVC administrator. The primary and secondary eye care teams meet every month at the SC to discuss ways to improve their performance. This meeting involves reviewing the previous month's performance and creating a strategy plan for the upcoming month. The clinical and operational heads of the VVC operations visit the secondary centers and VCs regularly. Apart from this, as mentioned above, there are ongoing refresher training programs.

Sustainability

The operational sustainability of the secondary center depends on several factors, including the skill level of the ophthalmologist and the corresponding reputation he or she develops in the community, the demand and supply dynamics in the surrounding region, presence of other large eye care service providers within a 100 km radius, and the location of the secondary center. Similar factors affect the operational sustainability of LVPEI's VCs. The fact that several SCs and VCs are already sustainable confirms the feasibility of the model. The sustainability of other components of the model, such as Human resources (HR) and community programs is described below ('Key Factors for the Success of the Model' Section).

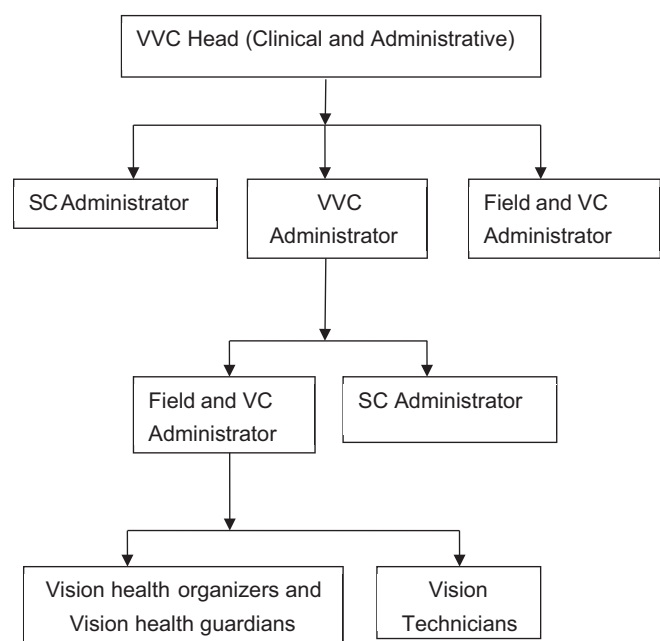


Figure 2: Organogram of village vision complex

Policy and planning

The model has been adopted as a primary eye care strategy by the WHO, the Indian government, the state government of Andhra Pradesh, and the Australian government (for its overseas development programs).

Key Factors for the Success of the Model

Human resources

The primary determinant of the success of either a SC or a VC is the quality of the clinical staff, especially the abilities of the ophthalmologist and the eye care team at the SC and the skill of the VT at the VC. In addition, the administrator of the SC is responsible for enhancing revenues and controlling costs. Finally, adequate support is required from ancillary clinical staff like nurses and other technicians. Therefore, the ability to recruit, train, and retain the staff is critical. LVPEI is able to handle HR recruitment and training issues by recruiting staff locally, training them in LVPEI, and then placing them at the SC/VC. Only the ophthalmologist, and sometimes the administrator, are posted from LVPEI. The ophthalmologists are posted as part of their comprehensive fellowship program. Similarly, there are ongoing training programs for administrators and other cadres of staff.

Retention strategies vary across cadres. In order to retain ophthalmologists, LVPEI relies primarily on its program in comprehensive ophthalmology, which requires that every fellow be posted at a secondary level eye center for a period of at least 1 year and ensuring the provision of an enabling work environment. This year affords them the experience of independently managing a secondary eye center and the opportunity to examine patients having a range of eye problems. With VTs, the strategy is different. Because these technicians are recruited, to the extent possible, from their native regions, they are more likely to stay on for the long term. The same strategy has resulted in successful retention of other support staff cadres at secondary level eye centers, including ophthalmic nurses, operating room technicians, opticians, medical records and stores personnel, patient counselors, and administrators (in some cases). Apart from this, there is regular ongoing mentoring of the team and career advancement and higher education opportunities are offered to most of the cadres working in the VVC.

Quality of services

One of the key factors for the success of the model is the quality of both clinical and nonclinical services. Overall, patient satisfaction is affected by the quality of the service delivered, the underlying systems and processes, infrastructure, interaction with staff and the general atmosphere.^[20,21] For clinical services, one of the major barriers for the uptake of eye care services is the “fear of surgery,” which is tied to the clinical outcome of cataract surgery.^[22,23] Therefore, clinical outcomes are regularly monitored.

Technology

Increasingly, both administration and patient care are being facilitated by technology. While the technology used in the VVC today is limited to the automation of certain clerical aspects of patient care and administration, it is expected that in the not

so distant future, even substantive activities will be facilitated by technology. This will in turn reduce dependency on highly skilled manpower, at least at the technician and administrator level. Today, technology is used to collect information remotely and compile the data centrally to ensure greater supervision, including feedback and better control over administrative aspects.

Location

Accessibility is as important as the need for healthcare. Accessibility reduces the cost associated with travel to the secondary center or VC and the time taken to make the visit. Otherwise, a lot of time and effort is spent mobilizing and motivating patients to visit the centers. Moreover, the SC or VC will attract more patients to visit directly on their own, owing to greater visibility in a busy area of the village or town. The LVPEI centers demonstrate that these factors have a comparative advantage toward greater sustainability of the model.

Community outreach

Awareness is critical to the uptake of healthcare services, especially in the context of eye care services, as they rank low and do not appear in the top five stated needs of the rural population. Therefore, community outreach programs are required to create awareness of both, eye conditions and the availability of a service provider to treat them.

Ongoing availability of funds

Though the VCs do not charge for the eye examination, they generate funds to pay for operational costs through sales of spectacles. Similarly, secondary centers offer tiers of service delivery for paying patients (two tiers of service for paying out-patients and three tiers for paying in-patients). In addition, an SC generates funds from the sales of spectacles.

Challenges

Though LVPEI has created a rural model for delivering excellent, efficient, and equitable eye care services to all sections of the community (irrespective of their ability to pay) and has also shown ways to address the issue of availability of human resources in rural areas, the model does pose challenges. The biggest challenge is the replication of the model both nationally and internationally, due to the underlying cultural specificity. Another challenge is related to integration of the model with the existing health care system.

We need to keep up with ever changing community dynamics. This involves an understanding of the beliefs of the community and other social determinants for the uptake of services. Though the vertical referral mechanism is successful to some extent, some of the barriers for the uptake of services with this referral mechanism still remain. Understanding these barriers and addressing them is another area of focus in the coming years.

Technology is constantly changing and keeping pace with it is another challenge. Tools like Geographic Information System (GIS), Monitoring Information System (MIS), Electronic Medical Records (EMR) need to be integrated. Already, new centers are coming up with EMR facilities and such automation is to be replicated across the entire LVPEI network.

The last challenge relates to the development of innovative and cost-effective models for service delivery, especially related to the identification and referral of the more chronic conditions like glaucoma and diabetic retinopathy (DR), which require long-term continuity of care. These models will not work in isolation and need to be part of the existing eye care and health care delivery mechanism. Studies are being planned for testing such models.

The Way Forward

Moving ahead, in the coming years, LVPEI will continue to focus on the VISION 2020 goals as well as work towards integrating the eye health pyramid model with the overall health system. For the success of the model to continue, local communities should take ownership of programs in their locality. Understanding the determinants for community participation and development and addressing the same will go a long way in ensuring the continued sustainability of the model. Understanding the incidence of various eye diseases and collecting the required evidence will enable planning and advocacy. Similarly, development of cost-effective models for screening glaucoma and DR will enhance the sustainability of the model.

Moving ahead, LVPEI plans to look at the impact and cost-effectiveness of the entire model using both quantitative and qualitative research methods. Similarly, we also plan to conduct intervention studies for modulating modifiable risk factors for diabetes and DR in the LVPEI network. In the realm of technology, development of GIS and MIS, along with expansion of the EMR facility for the entire LVPEI network will be the focus in the coming years.

So, the way forward involves integration of the LVPEI model with the existing health system, developing models for screening for DR and glaucoma, generating evidence for advocacy and planning and promoting community participation and community development at all levels of the LVPEI pyramid so as to continue the LVPEI journey of providing high quality comprehensive eye health care based on the principles of excellence, equity, and efficiency.

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