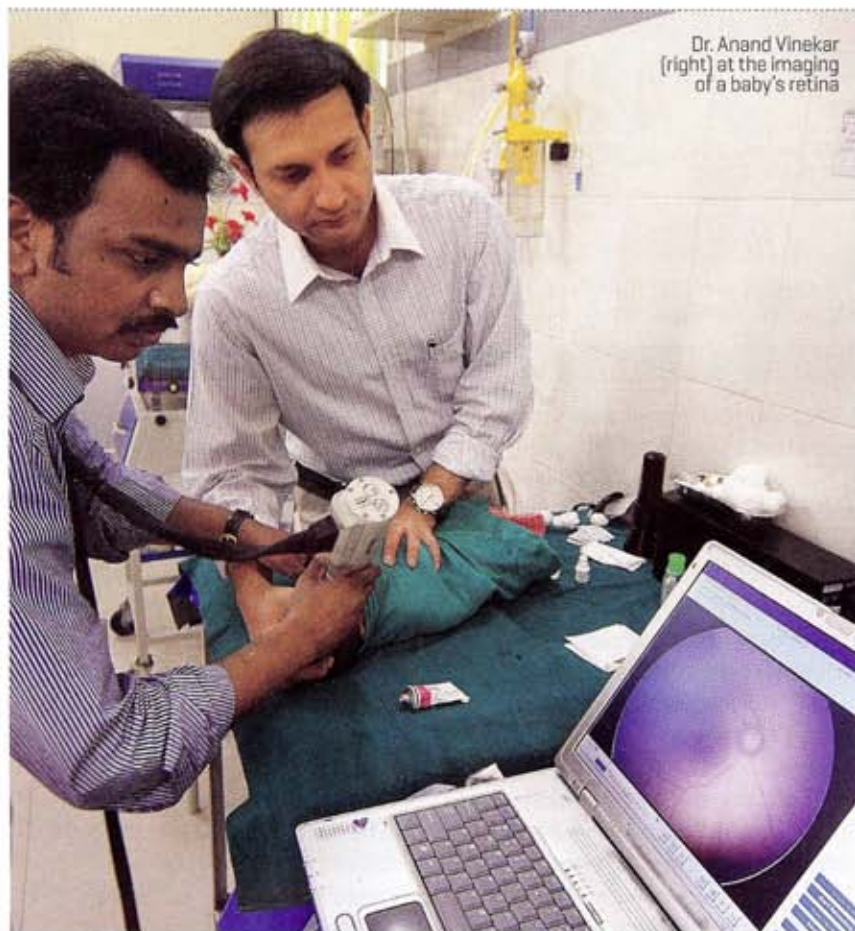




Pixel Prescription

venture

A PROJECT HELPS FIGHT BLINDNESS IN REAL TIME BY CONNECTING PATIENTS IN A VILLAGE WITH DOCTORS IN THE CITY. *By Kunal N. Talgeri*



Dr. Anand Vinekar (right) at the imaging of a baby's retina

helm of a tele-ophthalmology venture in Karnataka funded by the government under the National Rural Health Mission. The Rs 2.3 crore public-private project, running at 24 centres under the aegis of eye-care hospital Narayana Nethralaya, is now in its third year.

The project has also brought Vinekar in touch with i2i Telesolutions, started by a group of engineers who earlier worked in Bangalore at semiconductor designer and supplier Texas Instruments. Launched with an investment of \$600,000 (Rs 2.73 crore), i2i has designed an app to transfer high-resolution images captured by Nethralaya teams at rural medical centres to specialists in cities. "We are the FedEx of medical images and data," says Sham Banerji, chairman and CEO of i2i.

Vinekar and i2i have also drawn heavily from another company in Chennai called MatrixView, founded by scientist Arvind Thiagarajan, who is its executive chairman. MatrixView's trademarked algorithm ABO (Adaptive Binary Optimization), which Thiagarajan invented, enables high-resolution images to be compressed for electronic transfer without loss of quality. Without compression, large-scale transfer of images wouldn't have been possible. Between them, Vinekar, i2i Telesolutions and Thiagarajan have developed an iPhone app that lets retinal surgeons access the images anywhere, anytime.

Vinekar, 35, an alumnus of St. John's Medical College, Bangalore,

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OR MOST OF 2007, Dr. Anand Vinekar, MD, lived in a Michigan apartment that doubled up as a vision rehabilitation centre by day. He was on a fellowship at William Beaumont Hospital in Royal Oak, which has one of the largest paediatric retinal facilities in the world. Part of his stint involved reviewing ophthalmic images taken over 10 years, an exercise vital for recognising patterns that could indicate ailments. Back then, Vinekar noticed another pattern: The images were from countries where telemedicine

models were at an advanced stage. In India, by contrast, there were no retinal cameras, and few centres were equipped to deal with retinopathy of prematurity (ROP), which causes blindness in low birth weight babies.

By mid 2009, Vinekar's understanding of those models had put him at the

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—Anand Vinekar, paediatric retinal surgeon at Narayana Nethralaya

completed his MBBS with a university record of 17 gold medals. In his chamber at Nethralaya, he explains how manual interpretation of the retina tends to be subjective in the absence of recorded images. The eye of the child has to be checked at one-hour intervals for 12 hours. “I am not storing any image... [so the opinion is] very subjective, and a high level of skill [is] required,” he says.

India has only 400 trained retinal surgeons, of which around 20 work on children. Vinekar is one of those 20. During his stint in Michigan, he came across a portable retinal camera that cost \$100,000. Back home in India in August 2008, he set out to find a hospital that would buy his idea to take paediatric retinal care to villages.

The seed of the idea came from the telemedicine pattern Vinekar had observed back in Michigan. If he succeeded in selling his plan, the retinal camera would also find a sponsor.

Five hospitals rejected Vinekar's idea, but he was able to convince

Narayana Nethralaya, Bangalore. He told the hospital that an SUV-mounted retinal camera could be used to begin work at three centres. That figure of three is now up to 24. Rural doctors would refer cases to neonatal intensive care units, where a Nethralaya team would be available on a specified day. Until now, 120,000 images of 8,500 patients have been uploaded on i2i servers for assessment. In a month, about 600 babies are checked and a session for each costs about Rs 250. But check-ups are mostly offered free.

By the time most ROP cases in rural areas are diagnosed, it's too late. So, early detection is critical. That's where the retinal camera helps. Images can be sent immediately to hospitals or specialists in the cities. They can check the images on smartphones or computers and send their opinion. Says Thiagarajan of MatrixView: “The i2i set-up enables doctors to either download the images in entirety, or stream them progressively.”

Vinekar says a follow-up in ROP

has to be done within 48 hours.

“Speed is crucial not only in the uploading and transmission of retinal images, but also in communicating feedback. The parents need the report before they go back to their village 50 km to 60 km away, because it may be a week before they make the next visit. That could be too late.”

i2i has a business-to-business model with 130 clients, ranging from hospitals and clinics to physicians. It currently grosses \$550,000 (about Rs 2.5 crore) per year. Of this, 80% revenue is derived from sale of software licences to hospitals like Narayana Nethralaya. The remaining 20% accrues on a pay-per-use basis for diagnostics, reporting and analysis, where the end user may not need the software beyond the short term. In the long term, after five years, Banerji hopes to invert the ratio, so that 80% revenue is from a pay-per-use. “The average revenue per report [retrieved] would then be the unit of exchange for telemedicine,” he says.

Vinekar has also worked up some scale at the hospital's backend. He is looking to create a line of technicians from a nonmedical background. “A technician's accuracy in detecting retinal diseases can improve if he goes through enough images of the stages and location [of an ailment],” he says. Once more technicians are trained, only images that need an expert's opinion would need to be uploaded.

Vinekar is now taking the Narayana Nethralaya model to the next level. “We will visit six district capitals in six days of the week. In each of them, we will cover three neonatal ICUs a day. We are looking at 18 hospitals being added every week. We will have eight technicians per zone. We have trained seven technicians for the north zone in Karnataka,” he says. ■



IMAGES TAKEN BY A RETINAL CAMERA CAN BE SENT IMMEDIATELY TO HOSPITALS OR SPECIALISTS IN THE CITIES, WHICH THEY CAN CHECK ON SMARTPHONES OR COMPUTERS AND SEND THEIR OPINION.