

OBSERVATIONS

A Novel Model to Deliver Advanced Eye Care for People With Diabetes Living in Resource-Poor Settings: Results of Care Provided to Date

An estimated 50.7 million people in India have diabetes (1), and 70% of the Indian population live in rural areas (2). Diabetic retinopathy (DR) develops in more than 75% of patients with diabetes within 15–20 years of diagnosis (3,4). We have developed a model of distributive advanced outreach care designed to bring screening and treatment of DR to rural and semi-urban areas of the state of Karnataka in India.

Nicknamed Nayana—or beautiful eyes in Hindi—the specially designed advanced eye care treatment unit (AETU) van is custom-built on a cargo chassis from Ashok Leyland Ltd. of India. The van has a 2 + 1 driver's cabin and an insulated air-conditioned treatment chamber. The van carries its own 7-kVA generator, which powers all of the equipment on the van. It also carries routine clinical furniture, a fundus camera with angiography facilities, a diode laser retinal photocoagulator, B-scan ultrasound, ultrasound biomicroscope, visual field analyzer, applanation tonometer, pachymeter, and YAG (yttrium-aluminum-garnet) laser.

To protect the equipment from jerks and vibrations likely to occur during travel, the equipment is disassembled and packed in custom-made boxes with molded polyurethane packing that includes movement arrestors. The packed boxes are placed in a shock-absorbing cage during transportation. The cage is supported by four large springs at its base and 7 springs on the sides and top to ensure that the entire weight of the cage floats in air to prevent vibrations from affecting the equipment. The instruments are reassembled at each location.

The program includes 83 ophthalmologists from 23 locations in 13 districts of Karnataka and the Vittala International Institute of Ophthalmology (VIIO), which agreed to comply with the established protocol of care. Patients requiring advanced vitreoretinal surgical procedures are referred to the base hospital. The ophthalmologists underwent training in the diagnosis and management of DR at VIIO as well as on the mobile unit.

The AETU van is equipped with an emergency medical kit, a laryngoscope, Ambu bag, and oxygen. During its field halt, the van is stationed at or very close to a medical facility.

The project area serves a population of 16.3 million people. The van visits 23 locations on fixed calendar dates of every month across 13 districts covering a distance of 4,500 km per cycle. The van has been in operation since 23 February 2006, treating an average of 80 patients per week. Overall, the van has provided exams to 29,000 patients, and 1,017 fluorescein angiograms and 6,998 laser treatments. Additionally, 513 sight-saving vitreoretinal surgeries have been performed at the base hospital, most of them either free of charge or at heavily subsidized rates.

The Nayana model has enhanced local capacity and skills through training and sharing of expensive equipment among semi-urban and rural ophthalmologists, empowering them to provide hitherto nonavailable services to their local communities. This model fills the gap between required and available services for DR in countries such as India. This approach will bring quality care for DR to the local population at a relatively low cost.

KRISHNA R. MURTHY, MRCOPHTH¹

PRAVEEN R. MURTHY, MS¹

SUBBAKRISHNA RAO, MSC¹

GOWRI J. MURTHY, FRCOPHTH¹

ANIL KAPUR, MD²

PIERRE LEFEBVRE, MD, PHD, FRCP, MAE³

From the ¹Vittala International Institute of Ophthalmology and the Prabha Eye Clinic and Research Center, Bangalore, India; the ²World Diabetes Foundation, Gentofte, Denmark; and the ³Department of Medicine, Division of Diabetes, Nutrition and Metabolic Disorders, University of Liege, Liege, Belgium, and the World Diabetes Foundation, Copenhagen, Denmark.

Corresponding author: Krishna R. Murthy, krmjr2000@yahoo.co.in.

DOI: 10.2337/dc11-2098

© 2012 by the American Diabetes Association.

Readers may use this article as long as the work is properly cited, the use is educational and not for profit, and the work is not altered. See <http://creativecommons.org/licenses/by-nc-nd/3.0/> for details.

Acknowledgments—The project and study were supported by unrestricted grants from the World Diabetes Foundation, Denmark; the Silicon Valley Foundation; and the Bharat Family Fund.

No potential conflicts of interest relevant to this article were reported.

K.R.M. contributed to the planning, data research, and writing of the manuscript. P.R.M., S.R., G.J.M., A.K., and P.L. were involved in planning the project and edited the manuscript.

Parts of this study were presented at the Sankara Nethralaya—Association for Research in Vision and Ophthalmology Diabetic Retinopathy Bench to Population conference, Chennai, India, 9–11 September 2010; and at the Annual Conference of the All India Ophthalmological Society, Jaipur, India, 5–7 February 2009.

The authors wish to acknowledge the contributions of the 83 participating doctors and ophthalmologists; the National Association for the Blind—Karnataka; the Department of Biostatistics, National Institute of Mental Health and Neuro Sciences, Bangalore, India, for provided statistical support for data analysis; and the Indian Space Research Organisation, which provided the automated dish antenna, satellite transmitters, and satellite links for teleconsultations.

References

1. International Diabetes Federation. IDF Diabetes Atlas [Internet], 2011. 5th edition. Available from <http://www.diabetesatlas.org/F>. Accessed 5 February 2012
2. Rural-urban distribution. http://censusindia.gov.in/Census_Data_2001/India_at_glance/rural.aspx [Internet], 2001. Government of India, Ministry of Home Affairs, Office of the Registrar General and Census Commissioner. Accessed 5 February 2012
3. Dwyer MS, Melton LJ 3rd, Ballard DJ, Palumbo PJ, Trautmann JC, Chu CP. Incidence of diabetic retinopathy and blindness: a population-based study in Rochester, Minnesota. *Diabetes Care* 1985;8:316–322
4. Klein R, Klein BE, Moss SE, Davis MD, DeMets DL. The Wisconsin Epidemiologic Study of Diabetic Retinopathy. III. Prevalence and risk of diabetic retinopathy when age at diagnosis is 30 or more years. *Arch Ophthalmol* 1984;102:527–532